THE DOCK & HARBOUR AUTHORITY

No. 153. Vol. XIII JULY, 1933

Editorial

The Port of Buenos Aires.

Buenos Aires, which is the federal capital of the Argentine Republic, is ideally situated as a port, it being sheltered by land on three sides. Access to the port is by means of the River Plate, which diverges into two channels at some 6¼ miles from the port itself. These two channels are named the North Channel, which terminates in the North Basin, and the South Channel, which terminates in the South Basin.

The port itself is divided into two sections: one section is the Madero Port and the other section the New Port. The construction of the Madero Port was first commenced in 1890 and comprises the North and South Basin, which are linked together by four docks known as Nos. 1, 2, 3 and 4. The North Basin is used exclusively for passenger liners visiting the port, owing to the excellent depth of water available in this basin.

The New Port, which extends northwards from the North Basin, consists of six basins and is the most modern part of the Port of Buenos Aires. Five of these basins have been completed, but the sixth is still under construction. Development of the land between these basins is temporarily held up owing to the economic situation prevailing at present.

The port is well equipped with mechanical appliances of all descriptions for the handling of cargo, the cranes available amounting to 784, with a total capacity of 2,419 tons. Of this number the Government own 539 cranes and 245 cranes are the property of private firms.

The port is also well equipped with warehouses and sheds, the total storage space belonging to the Government amounting to 1,080,497 cubic metres (1,413,290 cubic yards). There is also storage space available which belongs to private firms.

For the repairing and docking of vessels the Port of Buenos Aires has available two dry docks which are situated on the north side of the North Basin, one of these being 150 metres (492-ft.) in length and the other 180 metres (570-ft.). These two docks are situated at a distance of 50 metres (164-ft.) from one another. There is also a floating dock for vessels up to 4,000 tons, this being situated in the South Basin.

Trade at the Port of Buenos Aires has decreased enormously in the last few years owing to the world depression. The last figures available are those for 1931, when imports amounted to 4,780,273 tons and exports 5,107,281 tons, with a total of 9,887,554 tons of exports and imports. This figure, when compared with 1928, shows a decrease of just over 2,500,000 tons.

The financial side of this undertaking has also naturally shown a decrease, the 1931 figures for imports being 956,054,629 dollars and for exports 497,165,113 dollars, a total of 1,453,219,742 dollars. Comparing this figure with the figure for 1928 there is a decrease recorded of just over 900,000,000 dollars.

The Port of Buenos Aires forms the Supplement for this month's issue and an illustrated article appears on another page.

Port Sanitary Conference.

Delegates from all parts of the country attended the annual meeting of the Association of Port Sanitary Authorities of the British Isles, held at Liverpool on June 1st and 2nd, when Dr. E. R. Peirce, the assistant port medical officer of health at Liverpool, read a paper in which he reviewed the development of the port of Liverpool, making particular reference to the origin and evolution of the present dock system. At a later stage in the proceedings, Dr. A. S. M. McGregor, of Glasgow, said it was an excellent and happy tradition that in every port where they held their meetings there was put before them a description and history of the area. Speaking as an official of a large port sanitary authority, he thought he could say that they looked upon Liverpool as a guiding light in matters of port sanitation.

Councillor R. J. Hall, of the Mersey Wharfage Co., who presided, remarked that Liverpool claimed to be the birthplace of the commercial dock systems of the world, when Mr. Steers came from Rotherhithe and constructed a dock on the site now occupied by the Liverpool Customs House. The Plymouth Port Sanitary Authority and the Grimsby Riparian Sanitary Authority were elected members. Alderman S. J. Brice, J.P., of Rochester, was elected president for 1933-34, and Councillor C. Canning, of Grimsby, vice-president. Dr. A. B. McMaster, of Dover, was re-elected secretary; Dr. C. F. White, of London, treasurer; and Alderman F. Askew, J.P., of Hull, auditor. The General Committee comprises: Councillor R. J. Hall, Liverpool; Alderman S. J. Brice, J.P., Rochester; Councillor Cyril Gamon, London; Dr. A. B. McMaster, Dover; Dr. C. F. White, London; Mr. W. L. Platts; Alderman F. Askew, J.P., Hull; Councillor C. Canning, Grimsby; Alderman J. E. Jones, J.P., Bristol; Alderman Mrs. L. M. Foster-Welch, J.P., Southampton; Dr. R. F. M. Picken, Cardiff; Dr. N. Gebbie, Hull; Dr. W. E. Harker, River Tyne; Dr. Howard Jones, Newport, with the addition of Dr. Frazer, of Liverpool; Dr. Walker, of Manchester; and Dr. Catto, of Newport. Next year's conference will be held in the Port of Rochester.

Completion of World's Largest Dry Dock at Southampton.

A record feat in engineering was established when the world's largest dry-dock, that built at Millbrook, Southampton, for the Southern Railway, was completed at the end of May, exactly two years after the order was given to the contractors to go ahead with the work.

The task of filling the dock was begun on the last day of May and occupied 70 hours. In that time 75,000,000 gallons of water were pumped into the dock by the reclamation hopper dredger "Foremost Chief."

The caisson which will close the entrance of the dock arrived at Southampton on June 18th after being towed from Haverton Hill-on-Tees, where it was made. The towage occupied eight days, the average speed for the journey being two and a half knots. The caisson, which has been built of British steel, is 138-ft. 6-in. in length, 29-ft. 6-in. in width, and 58-ft. 6-in. in depth. It displaces 4,500 tons of water. The ends and bottom of each side have been faced with greenheart timber. The faces have been finished with such accuracy that the maximum gauge between the gate and the granite walls of the recess into which the caisson will fit when the dock is closed will not exceed four one-thousandths of an inch. At very high tides when the dock has been pumped dry there will be an outside water pressure on the caisson of 6,000 tons.

The caisson will not be placed in position at the entrance to the dock until after the official opening by the King on July 26th.

Blyth Harbour Improvement.

At the May meeting of Blyth Harbour Commission, Mr. Ridley Warham referred to the Commissioners' decision to carry out works in extending the water area of the tidal basin in the upper harbour. He said owing to continuous slipping of the embankment it had become necessary to adopt another form of support by using steel sheet piling. This would enable the water area to be extended and the present shoaling to be restored to its original depth of 25-ft. Apart from the steel sheet piling, the remainder of the work would be carried out as opportunity occurred.

Wellington Harbour Board

THE Annual Report of the Chief Executive Officer and Secretary on the trade and shipping of the Port of Wellington, the financial results, and of the principal events of the year ended September 30th, 1932, are given herewith.

Trade of the Port.

The total trade of the port shows a decrease over last year, due principally to the continued falling off in imports. There has been an improvement in volume of the export trade and, provided it continues, there should be an increase in imports during the forthcoming year.

The decrease in imports from British and foreign ports was considerable and the imports from coastal and Australian ports also show a drop. Transhipments from British and foreign ports, as well as from coastal ports, have likewise decreased, whilst transhipments from Australian ports remain about the same.

Exports of our primary products have increased to British and foreign ports. The principal increases are in frozen meat, cheese and wool, but butter shows a decrease. Exports to coastal and Australian ports have not improved.

Shipping arrivals are less than last year, due to the decreased trade, and the net tonnage of vessels show a relative drop.

Cargo Analysis.

The combined total of imports from and exports to various countries amounts to 1,488,998 tons, as compared with 1,786,224 tons last year, a decrease of 16.6 per cent.

Inward cargo of all classes was 743,564 tons, a decrease of 194,909 tons, or 20.8 per cent.; British and foreign imports of all classes amounted to 311,198 tons, a decrease of 117,411 tons or 27.4 per cent.; and Australian imports (75,717 tons) decreased by 37,793 tons, or 33.3 per cent.

Transhipments of British and foreign cargo (45,961 tons) decreased by 33.8 per cent.; Australian transhipments (6,528 tons) were about the same; and coastal transhipments decreased by 17.3 per cent., or 125,484 tons.

Outward cargo of all classes (389,488 tons) declined by 3,275 tons or 0.8 per cent., as against 392,763 tons. Exports to British and foreign ports increased by 13,069 tons, or 8.3 per cent., to 169,592 tons. Australian exports (37,020 tons) were about the same; and coastal exports dropped from 198,772 tons to 182,876 tons, or by 8 per cent.

The importations of timber show a further decrease, the figures being 2,979,681 super feet, a decrease of 6,294,786 super feet, or 67.9 per cent. Timber exports decreased by 137,570 super feet, or 11.1 per cent.

Coal landed or transhipped (243,616 tons) decreased by 57,612 tons, or 19.1 per cent.; coal passing over wharves and paying wharfage amounted to 131,784 tons, a decrease of 21,150 tons, or 13.8 per cent.; Government coal exempt from wharfage decreased by 14 per cent. to 74,162 tons. Coal transhipped overside (37,670 tons) decreased by 39.3 per cent.

The tonnage of oils in bulk pumped ashore shows a decrease of 40,618 tons, or 18.9 per cent., to 174,563 tons. Bulk oil outwards was about the same as the year preceding, the figures being 102,688 tons this year. Bulk oils transhipped, mainly in fuel oil for bunkers, decreased from 36,571 tons to 21,676 tons, or by 40.7 per cent.

There was an increase of 7,358 bales, or 4.1 per cent., in the quantities of wool and skins shipped this year, the total being 187,192 bales, of which 91,233 bales were pressed; wool transhipped increased by 2,705 bales, or by 5.7 per cent.; and wool from shore and rail increased by 4,653 bales, or by 3.5 per cent.

Hemp and tow shipments have increased by 1,786 bales, or 20 per cent., to 10,714 bales, of which 100 bales were pressed.

The total number of bales of wool, skins, hemp and tow, upon which the Board received storage during the year ended September 30th, 1932, amounted to 101,696 bales, or 54.3 per cent. of the total bales shipped.

Butter exports dropped from 18,598 tons to 16,397 tons, or by 11.8 per cent.; cheese increased from 39,641 tons to 41,406 tons, or 4.5 per cent.; and frozen meat showed a further increase of 8,816 tons, or 21 per cent.

Shipping Arrivals.

The total net register tonnage of trading vessels entering the port during the year (excluding 25,216 tons representing warships, lighters, fishing vessels, private yachts, etc.) amounted to 3,493,476 tons, a decrease of 71,422 tons, or 2 per cent. For comparison with those ports combining the arrivals and departures, the total net register tonnage of trading vessels that arrived and departed from and to overseas and coastal ports during the year was 6,837,740 tons.

Export Values.

The total value of all overseas exports from the Port of Wellington for the year ended September 30th, 1932, was, from the H.M. Customs returns, £9,502,941, compared with £8,902,706 last year, an increase of £600,235.

Import Values.

The total value of all imports, including specie, during the year ended September 30th, 1932, was £7,659,872, compared with £10,010,692 for the previous year, a decrease of £2,350,820.

The total value of imports into New Zealand during the year ended September 30th, 1932, was £22,780,628, and of exports £36,570,556, so that over 33 per cent. of the total imports and 25 per cent. of the total exports passed through the Port of Wellington.

Financial Results.

The receipts for the year were £343,153 5s. 8d., a decrease of £37,971 18s. 7d., and the expenditure £337,579 4s. 8d., a decrease of £37,967 12s. 10d. The net surplus on the year's working was £5,574 1s. 0d., compared with £5,578 6s. 9d. last year.

The principal decreases in revenue were in wharfage on imports, port charges, berthage, and hire of cranes. Apart from the ordinary savings in expenditure, further reductions were made as a result of staff retirements, the full operation of the 10 per cent. reduction in salaries and wages, allowing one week off in every five for regular casuals, and to giving " time-off " in lieu of paying for overtime.

The total assets of the Board are now £2,947,150 13s. 9d., and the liabilities £1,259,418 11s. 5d., the balance of assets over liabilities being £1,687,732 2s. 4d., an increase of £62,207 10s. 1d. This is made up principally by increases in sinking funds amounting to £33,542 0s. 11d., in special funds amounting to £23,091 8s. 2d., and the balance on the year's working of £5,574 1s. 0d.

The public debt remains the same, namely, £1,250,000 against which there are now sinking funds amounting to £573,279 5s. 2d., leaving a net indebtedness of £676,720 14s. 10d.

A new fund has been opened called the " Dock Replacement Fund," and an annual appropriation of £2,661 is to be made to this fund to provide for the replacement of the floating dock.

The Port of Amsterdam

The position of the Port of Amsterdam can be seen from the following figures in regard to number of vessels and tonnage and to goods traffic arrived and sailed, as compared with the corresponding figures of last year:—

SEAGOING VESSELS AND TONNAGE.

		ARRIVALS				SAILINGS				
		No.	Per Cent.	N.R.T.	Per Cent.	No.	Per Cent.	N.R.T.	Per Cent
May	1932	291		429,147		268		378,263	
"	1933	265		367,416		275		381,867	
		—26	—8·93	—61,731	—14·38	+7	+2·61	+3,604	+0·95
April	1933	249		333,242		250		329,689	
May	1933	265		367,416		275		381,867	
		+16	+6·43	+34,174	+10·26	+25	+10·0	+52,178	+15·83
Jan.-May	1932	1,366		2,023,566		1,363		2,022,388	
"	1933	1,302		1,861,571		1,314		1,903,523	
		—64	—4·69	—161,995	—8·01	—49	—3·60	—118,865	—5·88

SEAGOING GOODS TRAFFIC
(In Tons of 1000 Kilos*).

			1 Import	2 Transit incl. in col. 1	Export	4 Transit incl. in col. 3	5 Total col. 1 & 3
April	1932	...	244,772	54,672	125,927	33,908	370,699
"	1933	...	229,365	53,850	116,424	39,303	345,789
			—15,407	—822	—9,503	+5,395	—24,910
			—6·29%	—1·50%	—7·55%	+15·91%	—6·72%
March	1933	...	313,182	79,857	168,817	57,696	481,999
April	1933	...	229,365	53,850	116,424	39,303	345,789
			—83,817	—26,007	—52,393	—18,393	—136,210
			—26·76%	—32·57%	—31·04%	—31·88%	—28·26%
Jan./Apr.	1932	...	1,188,522	211,998	532,632	130,893	1,721,154
"	1933	...	1,114,141	235,204	517,389	180,235	1,631,530
			—74,381	+23,206	—15,243	+49,342	—89,624
			—6·26%	+10·95%	—2·86%	+37·70%	—5·21%

*These figures have been taken from the monthly statistics of the Central Bureau, The Hague, Holland.

New Thames Wharf at Wandsworth

Reinforced Concrete Structure for Wandsworth and District Gas Company

THE Wandsworth and District Gas Company, as part of the development scheme prepared by their Chief Engineer, Mr. C. M. Croft, M.I.Mech.E., is constructing new river works on the Thames at their Wandsworth works. The scheme provides for an entirely new system of coal delivery from the Company's fleet of colliers, and embodies a coaling pier as receiving station, with bunkerage of about 1,700 tons capacity, the crane equipment being such as to enable the 2,300 tons d.w. steamers to be discharged in one tide. The coaling station is unconnected with land except for conveyors, the coal being either conveyed by the latter to land or discharged into 1,000 tons barges, which will moor alongside a new wharf, comprising another part of the scheme. Both the coaling station and the wharf are being carried out in reinforced concrete, and the wharf is now nearing completion, the accompanying views having been taken during construction.

The new wharf frontage is about 1,700-ft. long and 20 to 30-ft. further out in the river than the existing wharf, the new land to the extent of about an acre forming a valuable addition to the Company's site. The wharf is designed on the platform system, described on several occasions in our pages as a cheap and efficient form of construction, and a typical section is shown in Fig. 1. From this it will be seen that the front wall consists of a line of sheet piles capped above H.W.L. by a heavy wall brought up to the 20.0 O.D. flood level, while a platform extends back to the raking trestles forming the anchorage and spaced at 15-ft. centres. Heavy wharf cranes run on the track provided by the capping beam and the crane beam over the raking trestles, while the trough formed between them is partly filled with soil to provide the necessary load for the rakers. The remaining space in the trough will be used for cables and pipes for gas and tar, hydraulic mains, etc. Fig. 2 is a back view showing the space between the old and the new wharf being filled in. Fig. 3 shows the wharf front, the whole of which lies in a curve following the sweep of the Thames at this point. Fig. 4 shows the platform with the crane track and the trough before filling in, while Fig. 5 is a view under the platform show-

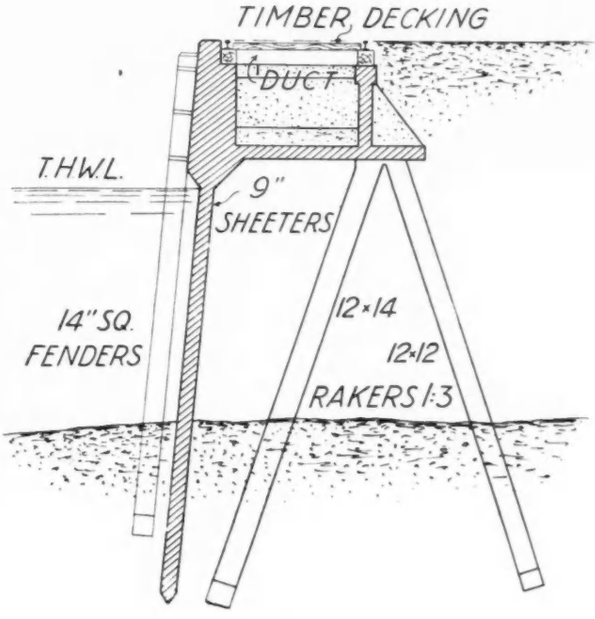


Fig. 1

Fig. 2.

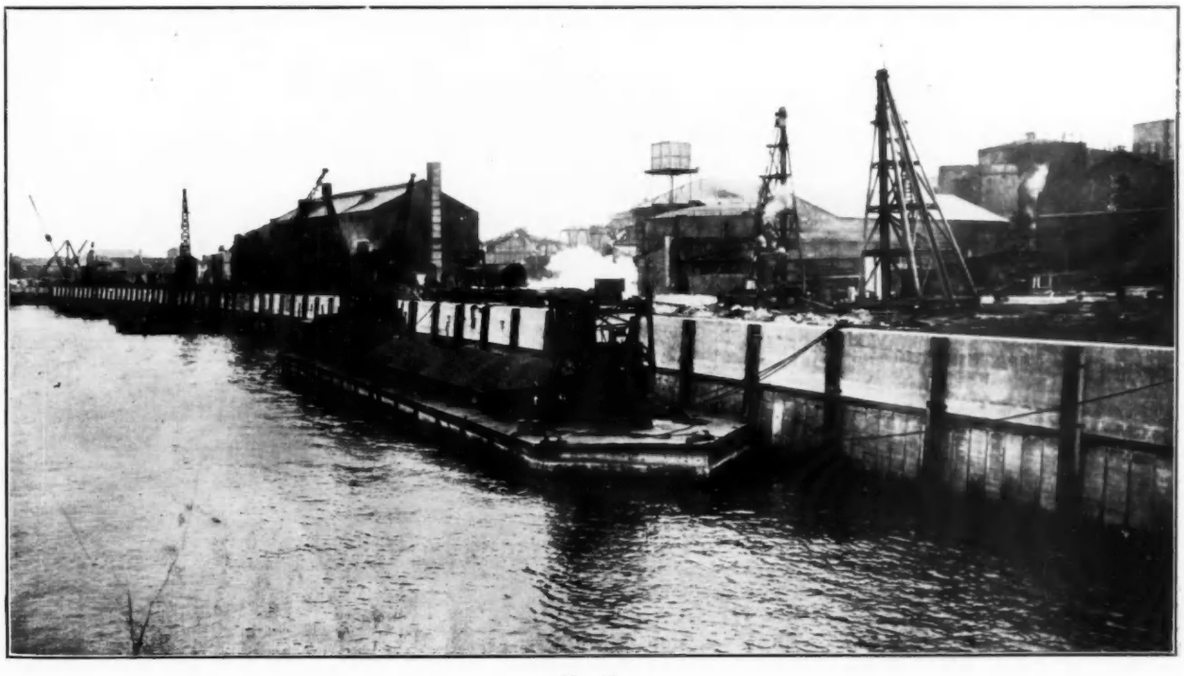


Fig. 3.

New Thames Wharf at Wandsworth—continued

Fig. 5.

ing the raking piles and the sheeters and also the super-structure, which is partly pre-cast.

The execution of the work, in which the time factor was all important, has several features of interest. The design is one that lends itself to speedy execution, and a special combined pile frame has been built to drive both the sheeters and the two rakers, with two winches of which the front one drives the sheeters and the back raker, while the rear winch drives the front raker. A force pump is also installed on the pile driver to supply water for the jet, which was found necessary owing to the hard driving encountered in some places. The question of temporary staging was solved in a simple and efficient manner, taking advantage of the fact that the river bed is dry for a short period at low tide. The staging consists of a number of stout timber trestles, sufficient to support a track length of about 75-ft., both for the pile driver and for the attendant crane, which travels in front of the work and keeps the driver supplied with piles. As the work proceeds and it becomes necessary to move the trestles forward, the crane leans over and picks up the rear trestle, which is out of commission, and places it in its new position in front of the track. In this manner the work is automatically cleared of staging by the pile gang and left ready for the superstructure gang to follow up immediately afterwards with the same length of repeat shuttering, constantly moving forward. Not only does this mean a minimum expenditure in staging and plant, but by careful organisation and attention to detail the progress of the work has been very satisfactory, an average rate being kept of a bay (15-ft. run) per day.

Mr. R. Stroyer, M.Inst.C.E., M.I.Mech.E., is responsible for the design of the reinforced concrete wharf and pier.

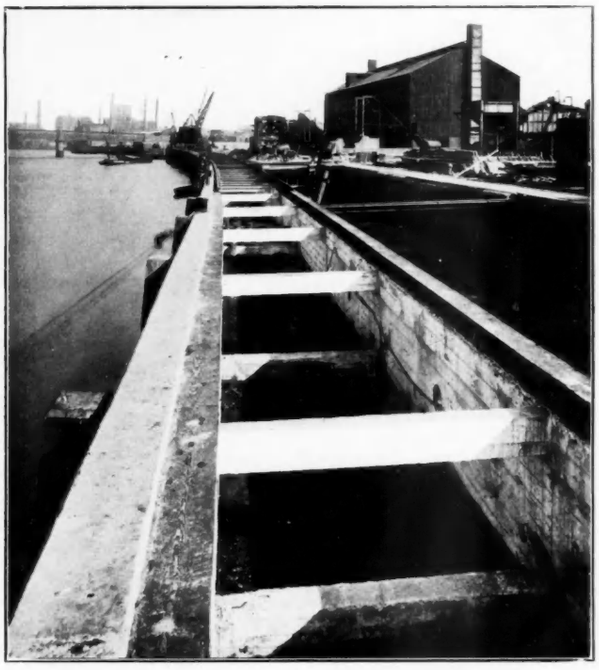


Fig. 4.

(see announcement on first page of advertisements)

Irish Harbour Matters

Dundalk

Dundalk Harbour Board.

At a meeting of the Dundalk Harbour Board, Mr. T. F. McGahon (chairman) presiding, the serious effects of the Free State Government's policy on the port was discussed.

Mr. Patrick Deery stated that large quantities of maize meal were being imported into ports of Northern Ireland and sent by road across the frontier into the Free State, to the detriment of Free State ports which formerly handled such traffic.

The chairman said that their accounts were a thousand pounds worse than twelve months ago. The better times they were expecting seemed to be a long time coming.

An application was received from the Dundalk and Newry Steam Packet Co. asking the Board to continue the present reduction in dues.

Mr. Little, manager of the company, stated that the port was losing very seriously through the tariffs on flour and sugar. Formerly the import trade of flour to Dundalk was 100 tons weekly at least, and a minimum of 50 tons of sugar. That had been reduced in both cases to a mere fraction. All the flour and sugar imported were coming through the larger ports to the detriment of the smaller ones.

Mr. Deery declared that 90 per cent. of the sugar now in the Free State came from Hamburg. The smaller ports got none of the trade. The loss was serious.

The reduction in dues to the shipping company was agreed to for a further twelve months, the hope being expressed that trade would improve.

Port of Southampton Topics

Big Improvement in Dock Statistics for May.

SOUTHAMPTON DOCK statistics for May show a big improvement in the trade of the port. Only one phase of the traffic suffered much—that in regard to passengers. The returns show that there was a decrease of 4,718 passengers inward as compared with the corresponding month in 1932, and a drop of 2,297 outward. The totals fell from 22,264 to 17,546 inward and from 17,604 to 15,307 outward.

This decline does not call for much explanation, for it is well known that the North Atlantic passenger business has been very seriously hit by the depression.

The number of vessels using the port during May was 279 inward, as compared with 285 in May, 1932, and 279 outward as against 284. The gross and net tonnage returns were, on the other hand, very satisfactory. The gross tonnage inward amounted to 1,506,533 tons, and outward to 1,529,345 tons, which have to be compared with 1,338,036 tons and 1,365,830 tons respectively for the corresponding month last year. The increases were therefore 168,497 tons inward and 163,515 tons outward.

As far as net tonnage was concerned the results were also gratifying, the inward total advancing by 92,263 tons and the outward by 99,539 tons. The figures were 799,884 tons inward as compared with 707,621, and 808,021 tons outward as against 708,482.

The aggregate increase in cargo amounted to over 10,000 tons—a very unusual jump. Imports rose from 41,445 tons to 51,165, and exports from 23,224 tons to 23,545.

Meeting of Southampton Harbour Board.

Southampton Harbour Board are pressing Trinity House to equip Nab Tower with a radio beacon to assist navigation.

The Mercantile Marine Department of the Board of Trade have informed the Board that if and when the Corporation of Trinity House submit to them a proposal to establish a beacon they will consider it. Trinity House have merely noted the Board's request.

The Harbour Board, at their meeting on June 22nd, agreed to write to Trinity House urging upon the Elder Brethren the need for the immediate provision of a radio beacon at the Nab Tower.

Because they consider it would be too near the deep water channel for safety, Southampton Harbour Board have expressed their objection to the application of Messrs. A. V. Roe and Co., Ltd., to the Air Ministry for a licence for the use of an area in Southampton Water as a civil aerodrome.

The Sliding Caisson for the Southern Railway Company's New Graving Dock at Southampton.

The Southern Railway Company, who own and manage Southampton Docks, are carrying out at that famous port one of the largest extensions taken in hand in recent years.

One of the principal features of these extensions is the construction of a dry dock which will be the largest structure of its kind in the world. It will be 1,200-ft. long, 135-ft. wide at entrance, and will have a depth of water of 48½-ft. over the keel blocks at high water of spring tides. Thus it will be able to accommodate the largest vessels afloat or projected for some years to come.

The entrance of this huge dock will be closed by a steel sliding caisson, which will be 138½-ft. long on the centre line, 58½-ft. high and 29½-ft. wide. Over 1,300 tons of steel have been used in its construction, the whole of which was of British manufacture. When in the normal working condition, that is to say, ballasted and in position so that the dock can be pumped dry, the caisson will displace about 4,500 tons of water. At very high tides, when the dock has been pumped dry, there will be an outside water pressure of some 6,000 tons on the caisson.

Provision has been made in the design of the dock entrance for the caisson to occupy any one of three different positions. At any of these positions, timber meeting faces on the caisson will form a watertight joint when in contact with accurately dressed granite meeting faces, or stops, on the dock. The normal working position will be against the inner stop, when water can be excluded from the dock at any state of the tide. The caisson will be placed against the outer stop when it is necessary to maintain a high level of water inside the dock, irrespective of the state of the tide outside. The third position is what is known as an " Emergency " stop, and this is situated at the extreme outside limit of the dock entrance; the caisson will be placed in this position when it becomes necessary to examine or repair the granite meeting faces, the steel slide path, or the caisson " camber " (or dock into which the caisson will be drawn to permit vessels to enter or leave the dry dock).

The caisson has been designed with a number of water ballast tanks in such a way that when these are filled the caisson will be scuttled, but if some are emptied it will float like an ordinary ship, in which condition it can be towed into another dry dock and repaired whenever necessary.

Normally, the operation of opening and closing the dock will be performed by sliding the caisson into and from the " camber " which has been built 30-ft. wide to receive it. Owing to the fact that the caisson weighs about 2,000 tons (excluding all water ballast), when it is required to be moved across the dock entrance certain water ballast tanks will be emptied until there will be a slight preponderance of weight at high tide on the slide ways, which will require hauling machinery of only moderate power to produce movement.

Were the ballast tanks pumped out still further and the caisson actually float, then hauling machinery of even smaller power might be used. This means that the caisson would then be a " floating " type and not a " sliding " type. It must be remembered, however, that when the caisson is being hauled across the entrance it displaces over 4,500 tons of water, making it imperative to have this large structure under complete control, otherwise there is grave risk of damage being done to the jambs and cill of both the caisson and dock. It is possible to alleviate this risk to some extent by making the caisson slide along the steel slide ways.

When it is required to place the caisson against the emergency stop however, most of the water ballast tanks will be emptied until the caisson floats well clear of the floor of the dock; it will then be towed out of its camber and manœuvred across the emergency stop, where the ballast tanks will again be filled and the caisson sunk into position, shutting off the water in the dock from that outside.

Another interesting feature is that a roadway has been constructed on the top deck in order that light traffic can travel across the caisson from one side of the dock to the other.

The dock has been designed and carried out under the direction of the Southern Railway Company's docks engineer, Mr. F. E. Wentworth-Sheilds, O.B.E., M.Inst.C.E., and the caisson has been constructed by Messrs. Furness Shipbuilding Co., Ltd., at Haverton Hill-on-Tees.

The steel sliding caisson was towed from Haverton Hill-on-Tees to Southampton, where it arrived on June 18th, the journey occupying eight days.

New Mersey Bridge

For 21 months work has been in progress on the new Mersey Bridge at Manor Lock, Warrington. It has just been completed at a cost of £50,000. The bridge, which is an important feature in the eventual linking up of the Manchester Road with the main Chester Road, crosses the Mersey a few hundred yards to the east of Manor Lock.

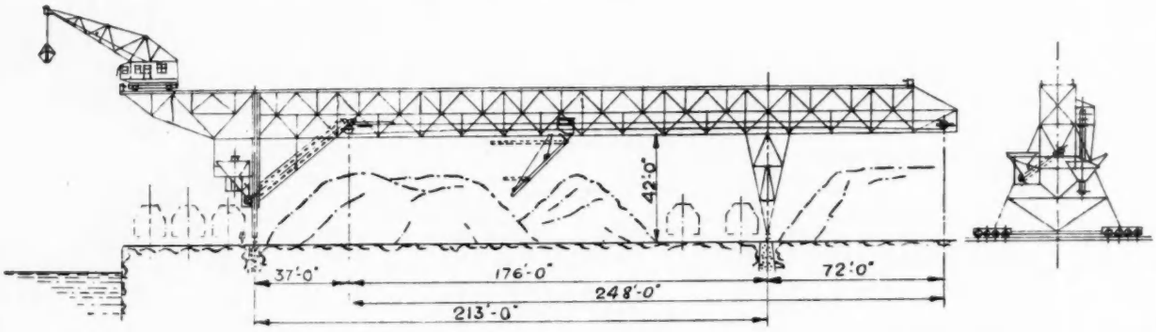
It consists of two reinforced concrete arches, each of 86-ft. clear span, and is 60-ft. wide between parapets, the roadway being divided up into a 36-ft. carriage-way, and two footpaths each 12-ft. wide.

The excavations for the foundations of both abutments and river pier were carried out in cofferdams of steel sheet piling to a depth and form determined in part by the conditions of strength and equilibrium required in the structure, and partly by the nature of the ground. The foundations, each of which contains more than 1,500 tons of mass concrete, appropriately reinforced, are all assisted by the presence of 100 reinforced concrete piles driven almost their full length into the ground beneath the foundations.

The roadway is constructed on hard rammed filling, curtained by the reinforced concrete standard walls, the approaches to the bridge being made by artificial embankments of easy grade. The footpaths on each bank of the river are taken through the abutments in brick-lined subways, while on the south side there is an additional by-pass for horses, built out under the arch itself.

Ship Discharging at Gothenburg Harbour

Steel Band Conveyor System Adopted



Ships laden with cargoes of coal and coke arriving in the harbour of Gothenburg (Sweden) were until recently discharged by travelling bridge cranes fitted with grabs, which served the area of a large stacking ground.

Obviously a crane itself occupied time in travelling along a bridge, especially when it had to go to the extreme end, and it was realised that if the crane could be retained in a fixed position and confined to the particular duty of grabbing, hoisting and slewing, a considerable saving of time would be effected and result in the speeding up of the discharge and earlier release of vessels.

One of the travelling bridges was equipped with a large loading hopper to receive grab loads as discharged by the crane, an inclined conveyor to raise the material from the loading hopper outlet to the actual bridge structure, to which was attached an auxiliary structure housing a steel band conveyor 250-ft. centres having a band 34-in. wide travelling at a velocity of 260-ft. per minute with a carrying capacity of 90 tons of coke or 150 tons of coal per hour, and requiring about 8 to 10 h.p.

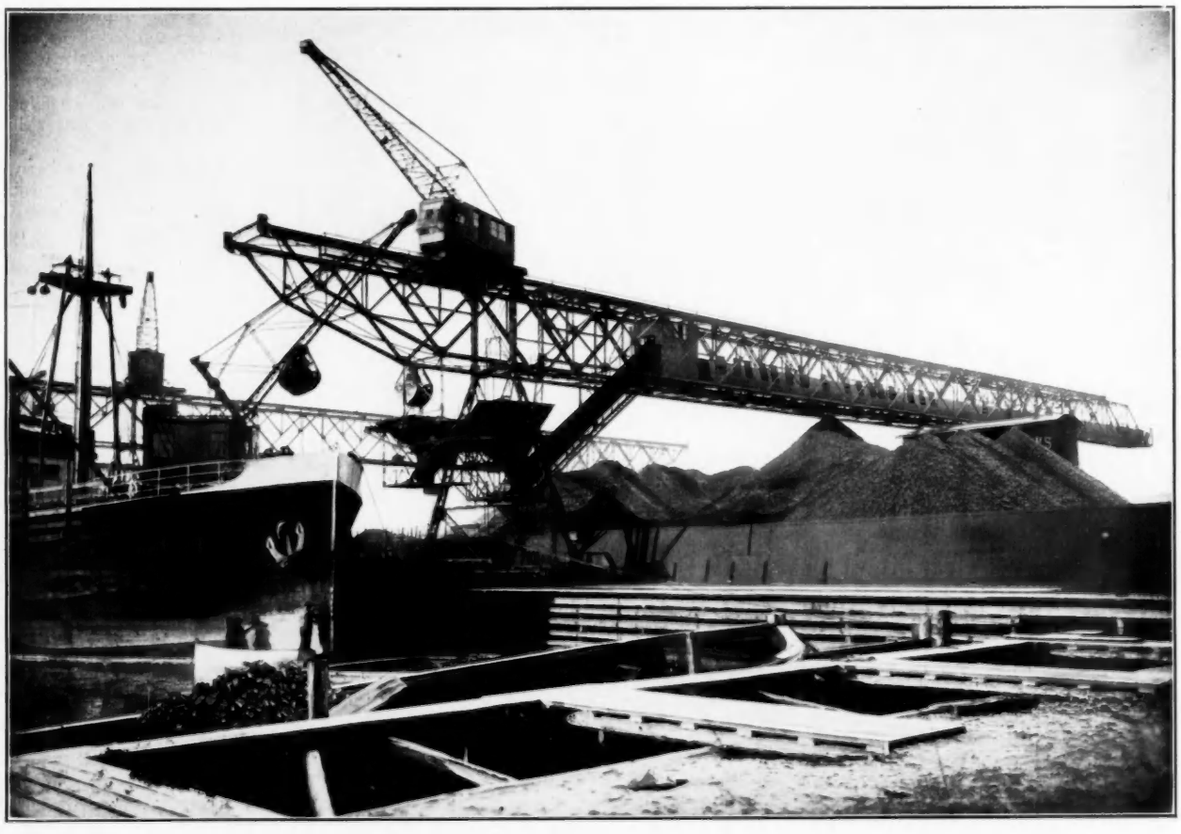
The conveyor incorporates a travelling carriage fitted with a plough which enables the load to be simply and effectively discharged to storage at any point throughout its length. The travelling carriage and plough is much smaller, lighter, cheaper, and has a longer effective travel than the corresponding tripper that would be required with a rubber belt. It is positioned by means of a wire rope and winch fixed close to the driving terminal of the conveyor.

The height from ground level to underside of bridge is 42-ft. clear, and an anti-breakage chute travels on the underside of the bridge structure so as to coincide with the position of the plough when unloading.

It was also found possible to equip the bridge with an auxiliary hopper and inclined conveyor to the main loading hopper to permit of two travelling gantry cranes being fitted with grabs and assist in discharging steamers. One of the auxiliary cranes discharges to the auxiliary hopper, the principal crane and the second auxiliary direct to the main hopper, and the load from all three is carried up the main inclined conveyor to the steel band which discharges and distributes it.

A particular advantage of the steel band conveyor for this duty is that it can be driven at the loading terminal, thus permitting the drive to be combined with that for the inclined conveyor. It also avoids placing the driving terminal on the overhanging end of the bridge.

The effect of this modification is to increase the rate of discharging steamers three-fold when delivering to near side and six-fold when delivering to far side of storage as compared with the previously existing arrangement, and it is a triumph for conveying, each item of the plant performing continuously and efficiently the real duty for which it is intended and best suited.



Ship Unloading at Gothenburg.

Concrete and its Many Uses in Docks and Harbours—I

By W. A. LINSKILL, M.Sc., A.M.Inst.C.E.

Introduction

CONCRETE.
- What it is.
- Cement the chief ingredient.
- Brief review of history of cement.
- Aggregate.
- Water ratio.
- Cracks in concrete.
- Effect of sea water.
- Early ideas about concrete.
- Mixing machines.
- Reinforced concrete.

DOCKS AND HARBOURS.
- Short descriptive summary.
- Wharves, Harbours, Docks, Locks, Graving-docks, Jetties, Warehouses.

Concrete

What it is.

WHEN water is added to cement, a slow chemical action takes place and the cement in a few hours begins to harden to a stone-like substance. If sand be used with the cement a mortar is formed which also sets hard, but with somewhat less strength than neat cement, and if broken stone or shingle be added to the mortar, concrete is obtained.

Cement the Chief Ingredient.

Since cement acts as the binding material in concrete, its strength is of first importance, and the excellence of present-day cement bears witness to the realisation of this desirable quality, besides being a tribute to the patient research and painstaking experiments on the part of those connected with the industry of its production.

Brief Review of the History of Cement.

The use of mortar is almost pre-historic. Sand-lime mortar was used in the building of the Pyramids. The Romans knew how to mix volcanic ash with burned lime and that the resultant product would harden under water. The art of making this cement was lost until, in 1796, John Parker patented what he called a " Roman " cement.

In 1810 Dobbs made an artificial Roman cement which he prepared from lime and about 50 per cent. of clay. In burning this he was careful to avoid vitrifying it, and thus missed the discovery of Portland cement.

A few years later we find Aspdin producing what he called Portland cement, but as it seems that he did not burn it to the necessary fusion point, it was not true Portland cement. It was called Portland cement because it produced a hard, stone-like substance of yellowish-grey colour which had a close resemblance to the well-known stone from the Portland quarries.

Progressive stages at last led to the correct burning of the clay and chalk to a clinker, and from then onwards we find true Portland cement of steadily increasing strength and fineness being produced. As governed by a " British Standard " specification, it is either " ordinary " for general use or " quick-setting " for use in tidal work and similar emergencies.

A few years ago a kind of super Portland cement possessing remarkable rapid hardening properties was manufactured and marketed, the earliest variety being sold under the name of " Ferrocrete." Rapid hardening cement has satisfied a growing need, and has undoubtedly contributed largely to the extension of the use of concrete in situations where ordinary Portland cement would prove inconvenient, such as, for example, road work and concrete piling. This is to be distinguished from the earlier and seldom used " quick-setting " kind, inasmuch as it preserves the advantage of normal *setting* time, ensuring workability, while the subsequent *hardening* process is so rapid that three-quarters of the time required for maturing is saved as compared with ordinary Portland cement.

Yet a third type of cement must be mentioned. This is Aluminous cement, which is even quicker in attaining strength than rapid-hardening Portland cement, but is more expensive.

Aggregate.

The crushing strength of concrete also depends on the size and character of the aggregate. The fine aggregate should be clean, sharp sand, free from all trace of loam or clayey matter, and graded from very fine to almost pea size. Its quantity should be sufficient when mixed with cement to fill completely all the voids in the larger aggregate. This proportion is usually taken at 50 per cent. of the larger aggregate. The latter should consist of hard, broken rock, brick, or clean shingle or ballast, and its size may vary according to the particular class of work proposed. For example, in mass concrete the size may be up to 2-in., whilst for reinforced concrete ¾-in. is a usual maximum size.

Water Ratio.

Variation in the amount of water used in making concrete so materially affects its strength that a short digression on the subject may be of interest to users of concrete.

A definite quantity is required to hydrate the cement, and this has been determined by tests, which show that a maximum strength is attained with a proportion of about 20 per cent. of water. To the minimum amount of water required for hydration must be added an extra allowance to compensate for absorption of water by the aggregate, evaporation during the processes of mixing, placing and setting, and other small losses. The resulting mixture will be found to be more or less plastic, and if properly punned and spaded should give a concrete of almost maximum strength, but opinions differ as to the practicability of obtaining such strength under actual working conditions.

It is considered by some that the addition of water in excess of the above requirements, to an extent that will produce a mixture that will readily flow, is of distinct advantage in ensuring thorough filling of the forms or moulds, and making for a more uniform distribution of the ingredients.

Those who favour the use of plastic concrete hold the view that all the advantages of fluidity can be obtained by judicious punning, and that excess water seriously impairs the strength of the concrete.

As the common aim is to produce a concrete of maximum strength, the real issue appears to be the differing valuation of the efficiency of mixing and placing the concrete. A concession to the " wet " concrete idea is necessary where concrete is poured from long inclined chutes.

After many years' observation of actual working conditions of all classes of concrete work, the author can only say that he prefers a concrete of a wet jelly-like consistency, slightly wetter than plastic and yet not fluid enough to travel down a chute without assistance. Such a mixture with reasonable spading and treading (or punning in the case of reinforced concrete) has uniformly produced a dense concrete of satisfactory appearance and (presumably) strength.

Cracks in Concrete.

Cases of concrete structures shrinking and cracking frequently come under the notice of engineers, and too much care cannot be taken to keep the concrete damp or even wet for some time after setting, and during the " curing " period, as the hardening of concrete in dry air is a contributory cause of contraction.

Some cracking, however, is inevitable and is not detrimental to strength if controlled as to position by the formation of definite predetermined joints.

Effect of Sea Water.

Sea water contains salts in solution which may penetrate the concrete and injuriously affect it and any steel embedded therein.

Magnesium sulphate is considered the most harmful of these salts. Precautionary measures to prevent such injury may take the form of using a specially rich and dense concrete impervious to penetration by sea water, or by the use of aluminous cement.

Mineral oils such as petroleum and its derivatives do not appear to have any deleterious effect upon concrete, but some vegetable oils are injurious, uniting with the lime content of the cement and causing disintegration.

Early Ideas about Concrete.

The use of lime concrete goes back to the early days of civilisation, but such use appears to have been limited to filling pockets in masonry structures, or in foundations, and even so late as 50 years ago cement concrete was not considered to be of safe use beyond such limits. The following quotation occurs in a book on " Civil Engineering " written in 1895 :—

> " Concrete has been extensively used for the foundations of structures of all kinds, and to a great extent for the filling or backing in piers and over arches. . . . Entire piers and abutments *may* be built of this material with proper care, and using the best cements."

Such was the general opinion of concrete at that time. It was useful for foundations, as backing to masonry abutments or walls, or as cheap filling to pockets in masonry. In fact, it was suitable material to put in a hole.

Concrete and its Many Uses in Docks and Harbours—continued

Its adaptability and cheapness compelled the attention of economic designers, whose demands resulted in the improvement of cement as regards strength and quality, and in the introduction of machines for mixing and handling the concrete. Mixing machines have also played a great part in the rapid progress of concrete.

From the early days of hand-mixed concrete of slow production, uncertain water proportion, and doubtful thoroughness of mixing, it is a great step to the modern concrete mixer, which by its mobility, cheap running, self loading, automatic measuring of aggregate and water, and efficient mixing capability, produces an economic and reliable concrete to any pre-arranged standard of quality and consistency.

Such a reliable constructive material was bound to be put to ever wider use, until the introduction of steel as a reinforcing material in combination with concrete placed them both at the head of materials of construction.

Reinforced Concrete.

From time to time, iron bars or old steel rails had been inserted into foundation concrete for the purpose of bonding adjacent lengths or for strengthening the foundation. It was probably such more or less haphazard reinforcement that led to the idea of the regular use of steel bars in concrete, first taken up by Monier, and further developed by later investigators into the present-day practice of reinforced concrete.

Docks and Harbours

A wharf or quay has been defined as " a bank of stone or timber on the shore of a harbour or river for loading and unloading vessels." In effect it provides a level area supported and edged by a vertical or slightly battering " step " or partition between land and water. On one side it retains and supports the ground at a convenient level on which warehouses and other buildings may be erected, and on which roads, paving and railway lines may be laid for the easy handling of ships' cargoes.

On the water side it permits the ground to be excavated or dredged to a depth sufficient to float a vessel close up to the edge of the quay.

If such a wharf be open to the sea, some means of ensuring calm water during stormy weather have to be adopted.

A breakwater, or more often two breakwaters, are constructed in the form of arms reaching out from the land and having a gap or entrance in the most favourable position.

While the harbour side of such piers or breakwaters may conform to the requirements of a quay, the outer or sea-face wears a different aspect.

Whereas in a harbour the water is tidal, in a dock this drawback is avoided by closing the entrance with gates, which open inwards to the dock and impound the water at flood level. Movement of shipping from berth to berth as required is thus rendered possible at any state of the tide.

A further development is to have two pairs of gates, thus forming a lock by means of which vessels may enter or leave the dock at any time within two or three hours of high water.

In these various forms of marine construction, wharves, docks, harbours, breakwaters, piers, locks, etc., the basic constructional unit is the retaining wall, whether of rubble, masonry or equivalent material, and of shape and strength designed to meet the particular requirements of each case, and in all cases built upon firm foundations.

Wharf and dock walls are designed to withstand pressure from the weight of earth behind them, probably increased by the weight of buildings or other structures on the quay.

Graving-dock walls have the same duty, and are built with a series of steps or altars on the face to facilitate placing the shores used when dry-docking a vessel. The entrance gates (if any) of course open outwards, but floating or sliding " caissons " are more usual.

Unlike an open dock, both graving docks and locks need a heavy floor, first to maintain watertightness and to prevent the difference of water pressure from lifting the floor and, secondly, in the case of graving docks, to provide support for the weight of the ship.

Adequately firm foundations are required for all these walls, and where the ground is bad, special methods have to be adopted.

When it is impossible on account of physical reasons, or impracticable because of economic limitations, to build solid walls for wharves or docks, then jetties are often substituted. A jetty is a platform at a suitable height above water level, and supported on piles driven into the sea or river bed, and extending outwards from the land into sufficiently deep water, for the safe berthing of ships.

After this brief description of Concrete and short summary of marine structures, it will be interesting to note to what extent concrete has replaced older materials used in such works.

Scottish Harbour Notes

Clyde Navigation Trust

Retirement of Mineral Traffic Superintendent.

After 26 years' service with the Clyde Trust, Mr. David Hopkins has retired from the position of Mineral Traffic Superintendent, having attained the age of 65 years. Mr. Hopkins was well known in the West of Scotland among shipowners and others connected with the shipping of coal and other minerals to and from Glasgow Harbour, and was not only an efficient officer, but generally popular and liked by all with whom his official duties brought him in contact.

Mr. Hopkins relinquished his office on June 2nd and left immediately for Dorsetshire, where he has taken up residence. Before leaving, he was the recipient of several gifts from officers and staff of the Clyde Trust.

Following on his retirement the Mineral and Goods Traffic Departments have now been amalgamated under one Traffic Department, Mr. Archibald Campbell, the Goods Traffic Superintendent, being appointed Traffic Superintendent.

Three New Ferry Boats.

The Clyde Trustees, at their last meeting, approved of the recommendation of the Ferries Committee to replace the three small passenger ferry boats by new boats, having each an accommodation for 140 passengers.

Of the three old boats which it is proposed to displace, one was built in 1899, and the remaining two in 1891, each therefore having been in service for over forty years.

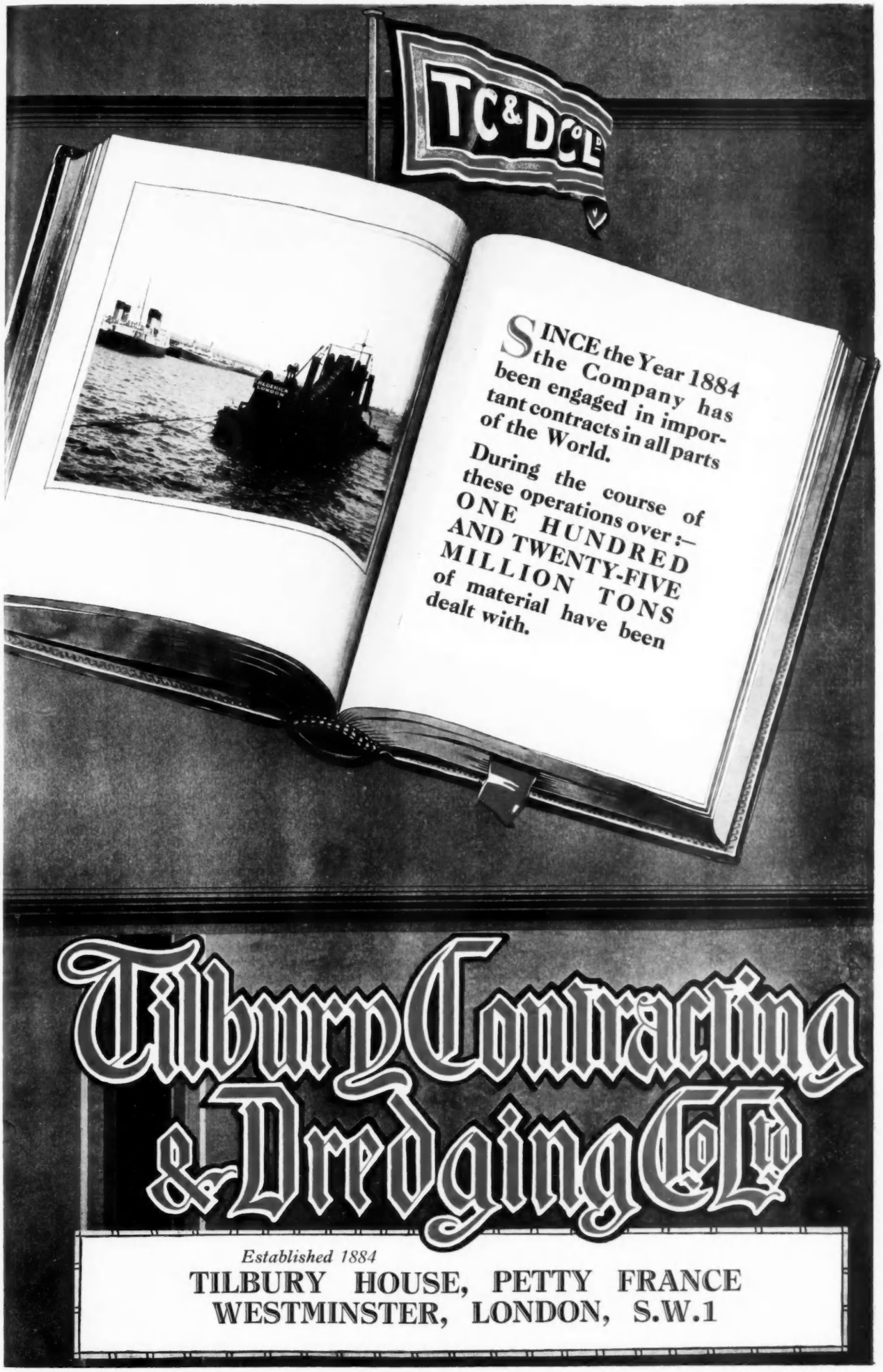
The new boats are to be built under contract and alternative prices obtained for steam or Diesel engines, the question of propelling power to be decided after tenders have been received and the approval of the Glasgow Corporation obtained in terms of the agreement with them in regard to the three ferries.

New Type of Mechanical Cargo-discharging Vessel.

It is reported that the invention by a Glasgow man of a new type of mechanical cargo-discharging vessel has been patented and that its possibilities as a commercial proposition are in the meantime being investigated. The invention (which represents many years of research work by a leading Clyde naval architect) consists of a stern-engined vessel of about 1,400 tons fitted with a quick cargo-loading device and endless conveyor for discharging. Cargoes which are handled in bulk are fed direct to the conveyor which takes them up a 70-ft. high tower in the bows and can empty the cargo into the holds of any type of ocean-going or cargo boat. Leading shipowners are understood to have expressed approval of the scheme, and its application in actual practice is now being awaited with much interest by all parties concerned.

Improvement Works on the Crinan Canal.

During the opening fortnight of the month of June the Crinan Canal was closed to traffic to allow of the completion of the improvement works which have been in progress during the past three years. The canal is an important nine miles waterway connecting Airdrishaig (Lochfyne) with Crinan, west of Kirtyre, and has been used for more than a hundred years by small craft plying between the Clyde and the Western Isles. Two new sea-locks have been constructed at Airdrishaig and Crinan at a cost of something like £60,000. It is felt, however, that something must be done soon to reconstruct the entire canal. During the summer months, when the hill reservoirs which feed the canal are at their lowest level, there is a tremendous daily leakage of water, and, as a result, the canal has sometimes to be closed for traffic in prolonged dry spells. It is estimated that at least £2,000,000 would be required to put the canal into a proper state of repair, and such a scheme was rejected by the Ministry of Transport three years ago.


T.C.&D.C.L.
SINCE the Year 1884 the Company has been engaged in important contracts in all parts of the World.
During the course of these operations over:—
ONE HUNDRED AND TWENTY-FIVE MILLION TONS
of material have been dealt with.
Tilbury Contracting & Dredging Co. Ltd.
Established 1884
TILBURY HOUSE, PETTY FRANCE
WESTMINSTER, LONDON, S.W.1

Shannon Power Development Scheme

Deepening of the River Shannon at Killaloe

FOR the installation of the Hydro Electric Power Station at Ardnacrusha, which has been in operation for some few years, a weir was built across the Shannon at Parteen, about 4 miles below Lough Derg storage basin.

Previous to the power development the water level on Lough Derg was partially controlled by a weir and sluices at Killaloe. The construction of the new weir at Parteen raised the water level in the River Shannon to the same level as Lough Derg, a portion of the old weir and all the sluices at Killaloe being removed. The new weir also allowed for the control of the water from the Shannon, diverted along a head race canal to the power station.

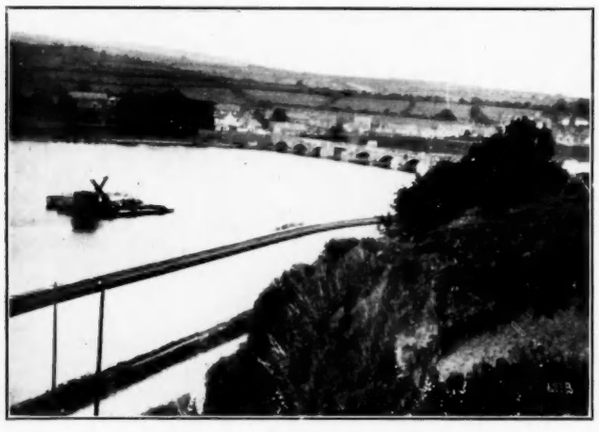
32-B Shovel on Pontoon, River Shannon.

The removal of the old weir and sluices still left a rather narrow and restricted passage for water at Killaloe and resulted in a loss of head between the lake and the intake to the canal, depending on the flow of water from Lough Derg.

This loss of head was a maximum (a) under flood conditions in the Shannon, (b) at low water levels on the lake, if the power station was giving its maximum output.

The loss of head amounted to 5-ft. between Lough Derg and Parteen Weir, with a discharge of 1,500 cusecs at Killaloe, with Lough Derg at top water level.

The maximum flow in the Shannon at Killaloe is about 28,000 cusecs and occurs very rarely; the normal winter flood is about 21,000 cusecs and is of very short duration. The difficulty of controlling this flow was overcome up to 1932, by keeping the lake about one foot below high water level during the months of December, January and February, and so absorbing the peak of the flood in the lake.



32-B Shovel on Pontoon, River Shannon.

Under the partial development of the power station, consisting of three turbines of 30,000 h.p. each, it was decided that the cost of the removal of the remainder of the old weir and the deepening the bed of the river would not be justified, but that the carrying out of this work could be executed at a later date, depending on the load development towards the end of the storage period and on the necessity for the installation of additional turbines at Ardnacrusha.

During summer of 1932 the Electricity Supply Board undertook the removal of the remaining portion of the old weir at Killaloe, and the excavation of a channel in the river bed at Killaloe. This channel was 36 yards wide and 500 yards long, the total amount of excavation being approximately 26,000 cubic yards place measurement. The material was very heavy boulder clay.

To carry out this work a Ruston-Bucyrus dipper dredge which consisted of a 32-B Diesel Shovel, mounted on a pontoon, was purchased. The excavator was equipped with a ¾ cubic yard bucket and extra long bucket arms in order to excavate to a depth of 12-ft. 6-in. below water level. The excavated material was dumped direct on to flat topped barges, which were towed by tug to Lough Derg, where the material was dumped.

The digging encountered throughout proved to be of the most severe nature, as the river bed is strewn with large rocks and boulders; in spite of this, however, the machine dealt successfully with the material.

At the present time work is actively proceeding on the installation of the fourth turbine unit of 30,000 k.w., and in order to cope with the increased water necessary, the Electricity Supply Board are preparing to undertake the final deepening at Killaloe.

This deepening involves the removal of 140,000 cubic yards of stiff boulder clay, the channel being 1,500 yards long and 60 yards wide. The depth of water in this channel will be 18-ft. 3-in. at the present maximum high water level in the lake. The proposed channel is to be kept as narrow as possible in order to avoid rock excavation.

32-B Shovel on Pontoon, River Shannon.

In order to carry out this work the Electricity Supply Board have purchased from Messrs. Ruston-Bucyrus, Ltd., of Lincoln, England, a second dipper dredge. The first machine ordered was only required to excavate to a depth of 12-ft. 6-in., but as the second portion of the work necessitated excavating to a depth of 19-ft. below water level, a larger excavator was necessary. A 43-B was therefore ordered with a bucket of ¾ cubic yards capacity and with the bucket arms sufficiently long to excavate to the required depth.

With the completion of this new channel the loss of head between Lough Derg and Parteen Villa is estimated to be 1-ft. 4-in. at 1,500 cusecs and 5-ft. at 28,000 cusecs. In addition, the maximum discharge through the four turbines necessary to meet the peak load of the station can be utilised up to practically low water level in the lake. This latter condition arises only when the lake is low and the inflow is equal to, or less than, the flow required for the turbines plus compensation water for the river below Parteen.

The effect of the deepening will be to increase considerably the peak load capacity of the station and to give satisfactory control of floods, so that the lakes can always be kept at high water level when the inflow is sufficient.

Dublin

Dublin Port and Docks Board.

At a recent meeting of the Dublin Port and Docks Board the question of the coal contract was raised, when Mr. McGrath said that he was dissenting from the recommendations of the Finance Committee on the subject. The Board could, in his opinion, get suitable supplies of coal from the Continent, as the Cork Harbour Board had done.

He had an opportunity of seeing an analysis of Dutch coal, and he held that the heating standard of Welsh coal was about 5 per cent. less.

The engineer had reported against a renewal of the contract on the grounds that the coal burnt too quickly.

Notes from the North

£4,500,000 Spent on Tunnel Engineering Works.

TO the June meeting of the Mersey Tunnel Joint Committee, Mr. B. H. M. Hewett, the resident engineer, reported on the progress of the tunnel works as follows: Contract No. 3, for the construction of the full-size tunnels on the Birkenhead side: (a) The contract amount is £749,075 3s. 1d.; (b) the estimated value of the work accomplished to date is £888,000, or 118 per cent. of the contract amount; (c) the fixing of the dado is continued, and about 7,390-ft. or 88 per cent. of the contract amount; (d) the interior finish is continued; (e) cable laying is continued; (f) work on the Rendel Street plaza is continued, work on the Chester Street plaza is continued; (g) the total number of men employed on this contract is about 220.

Contract No. 4a, for the construction of the reinforced concrete roadway and other interior concrete in the circular cast-iron lined tunnel under the river. The state of the work is as follows: (a) The contract amount is £384,884; (b) the estimated value of the work accomplished to date is £378,000, or 99 per cent. of the contract amount; (c) the fixing of the dado is continued—about 8,300-ft. or 80 per cent. has been fixed; (d) the interior finish is continued and 4,959-ft. or 93 per cent. of the total 5,315-ft. has been done; (e) cable laying is continued; (f) the number of men employed on this contract is about 90.

On the four contracts the total contract estimate of £1,845,576 has been exceeded, the total cost to date being £1,986,000. The number of men employed is 560. Previous sums expended include £643,581 and £1,478,367 on the first two contracts for the boring and completion of the iron-segmented tunnel under the river.

In addition to all these contract amounts, the following amounts have been spent in constructing the ventilation works, as authorised by resolution at the May, 1931, meeting: New quay, £16,000; North John Street, £66,000; George's Dock, £61,000; Woodside, £45,000; Sidney Street, £35,000; Taylor Street, £16,000; total, £239,000.

The ventilation fan contracts Nos. 5a and 5b, held by Messrs. Walker Bros., of Wigan, and by the Sturtevant Engineering Company, of London, respectively, are making good progress, as also are contract No. 6 for electric lighting fittings, held by the Edison Swan Electric Company; contract No. 8, driving gear and electrical equipment, held by Metropolitan Vickers Electrical Co., Ltd., and contract No. 10, electric cables, held by the Mersey Cable Works, Ltd. The total value of engineering works to date is £4,472,550.

Fire at Liverpool Dock.

Part of the warehouse alongside the quay at No. 1 Branch of Canada Dock, Liverpool, allocated to the Pacific Steam Navigation Co., has been destroyed by fire. The total damage to the warehouse and stores amounts to about £5,000.

The flames had burst through the roof and were shooting high into the air by the time the fire brigade arrived. They could be plainly seen from the Cheshire side of the Mersey. Fortunately the salvage corps was able to remove several cylinders of oxygen before they became involved, but some alarm was caused when several drums of paint exploded. Although no vessels were moored alongside the quay adjacent to the burning shed, there were a number of vessels in the dock, and a skeleton crew was kept on duty to deal with any flying sparks.

After three hours' strenuous work, the fire was extinguished, and the major portion of the dock shed, which runs the whole length of the quay, was saved.

Pensioned Off.

One of the best-known boats which travelled along the Manchester Ship Canal, the "Joseph Thompson," which was originally owned by the Manchester Corporation Rivers Department, for carrying sewage sludge from the Manchester Sewage Works to the Bar at Liverpool, is now being broken up at Runcorn. During her active career the " Joseph Thompson " made 6,675 trips to the deposit ground in Liverpool Bay, 22 miles beyond the Liverpool landing stage. She has covered a distance of 801,000 miles and has deposited 6,870,000 tons of sludge. The original speed of the boat was 11 knots, but age reduced this very considerably towards the end of the boat's life, when she could barely touch nine and a-half knots. The " Joseph Thompson " has been replaced by the " Mancunium," which is a much bigger ship. She has a length of 246-ft., a beam of 38¼-ft., a moulded depth of 16½-ft., and will sail with a mean draught of 12-ft. when loaded. Her gross register is 1,286 tons, and she has a speed of 12 knots. She cost £46,000 and was built by Ferguson Brothers (Port Glasgow), Ltd.

Appreciation of Mr. James Barron by Ribble Committee.

The Ribble Committee of the Preston Corporation has placed on record their appreciation of the valuable services rendered by Mr. James Barron, M.Inst.C.E., as Ribble engineer and general superintendent of the Ribble undertaking over a period of 32 years, " during which he has carried out important works connected with the improvement of the navigation and of the undertaking generally with conspicuous ability."

Caernarvon Harbour Trust.

At the June meeting of the Caernarvon Harbour Trust, the Superintendent (Captain Richard Jones) reported that the bar channels had been sound during the month, and the depth of water still continued satisfactory. The buoys had been examined and everything found in order.

Rat Proof Dock Sheds.

With the exception of a few of the old docks in the central district of Liverpool, the wharves of the Mersey Dock Estate are of rat-proof construction, made with ferro-concrete and stone. Discussing the precautions taken against rats in the dock area of Liverpool, Dr. W. M. Frazer, Medical Officer of Health to the Liverpool Port Sanitary Authority, in his annual report states that the roadways and pavings of the sheds are sets on a concrete foundation. The sheds are built of brick and reinforced concrete. All sheds in the new Gladstone Dock are constructed solely of reinforced concrete, and there are no ledges, beams or angle iron on which rats may run. All offices and wooden huts in the sheds are made rat-proof either by being 18-in. clear of the ground or sheathed with iron or cemented round the base. New offices or other buildings are either built on brick or concrete piers clear of the ground, or the base is built hard and close to the paving of the shed.

The Mersey Docks and Harbour Board and the various shipping companies are fully alive to the necessity and benefit of rat-proofing, and practically all sheds, huts, offices and warehouses on the dock estate have now been made rat-proof. Constant supervision is required, however, in the case of stores, otherwise they tend to become harbourages for rats. It is the duty of the sanitary inspectors to see that all stores are kept clean and tidy, and that no rubbish is allowed to accumulate. Old rope, dunnage, wood, etc., must be stacked neatly on platforms raised 18-in. from the ground, and the space beneath the platform must be kept clean and free from rubbish.

New Ship Canal Bridge.

In order to ensure the quick execution of the contract for the reconstruction of the Stag Bridge at Lower Walton, the Manchester Ship Canal Co., Ltd., agreed to pay a bonus to the contractors if the bridge was put into commission in less than 21 days from the commencement of the contract. Before the raising of the bridge for the fitting of new rollers and roller-paths, the contract for which was placed with Sir William Arrol and Co., Ltd., huge protective timbers had to be constructed and placed on barges which were moored to protect the bridge as a precaution against the structure being damaged by passing vessels. Piles were driven into the embankment alongside the bridge as a rear support for the booms on the barges, and the lifting of the bridge was then proceeded with. The bridge, which weighed about 930 tons, had to be raised 10½-in., and this was done by means of four 350-ton hydraulic jacks.

At one time as many as 30 masons were employed in removing a portion of the granite base on which the bridge rests. The latest type of granite cutting tools, for the operation of which a compressor had to be installed on the site, have been used. In addition, a travelling crane was almost continually in use, and worked proceeded day and night. The rollers were of cast iron and the new ones of cast steel, which, it is hoped, will be even longer lasting than those fitted when the bridge was built, which was in 1892 or 1893. The canal was opened in 1894, and when it is stated that the bridge has turned between 690 and 700 times a month, it will be readily understood that there had been a considerable wear on the mechanism over a period of some 40 years. Hydraulic power for the turning of the bridge is derived from Latchford Locks *via* the tall building, technically described as an " accumulator," which is on the embankment opposite Ellesmere Road. When the bridge is swung back to its normal position after the passing of a vessel, a large portion of its weight is taken up by the knuckle gear on the abutments on either side. The renewal of the roller-paths and rollers will raise the bridge back to its original height, and the necessary adjustments of the kerbs at each side are being made so that the bridge roadway will be brought to the level of the fixed roadway at either side.

Notes from the North—continued

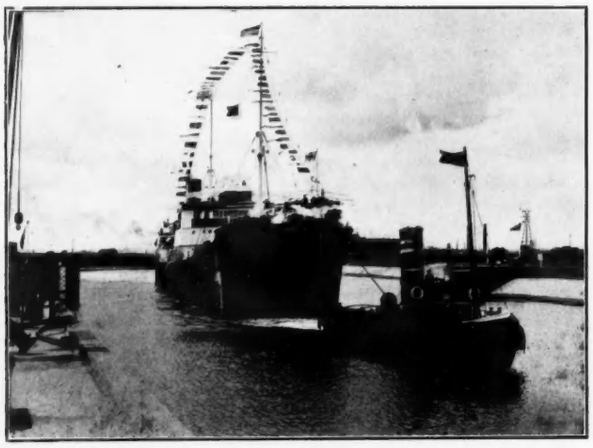
New Stanlow Dock.

Stanlow Dock, Ellesmere Port, which was opened by the Minister of Transport, is to-day part of the second oil port in the Kingdom—Manchester. The heavy oil traffic of Manchester has developed until the storage tanks number 146, with a capacity exceeding 206,000 tons (over 51,000,000 gallons).

Situated 4½ miles from the Eastham Lock (River Mersey), the old dock at Stanlow, which was opened in July, 1922, resulted in close co-operation between the oil interests and the Manchester Ship Canal Co., and traffic increased until it became necessary to add a second dock and expedient to reserve more land for the extension of storage and refining plant.

No. 2 Dock, larger than its predecessor, opened in May, more than trebles the importing capacity at Stanlow, where all volatile oils, flashing at 73 deg. F. or under, are discharged. There are 77 tanks at Stanlow with a capacity of over 258,000 tons (over 66,000,000 gallons). The tanks at all points on the canal number 234, with a total storage capacity exceeding 118,000,000 gallons.

The new Stanlow oil dock at Ellesmere Port has cost £200,000. The storage and refining plant is all on the south side of the canal, while the docks in which the tankers discharge are on the opposite side of the waterway. This is one of the many safety precautions adopted by the company in designing works.



Photo] [Manchester Guardian and Evening News

Opening of Stanlow New Oil Dock.
The "British Duchess" entering the new dock.

The first dock to be constructed, 600-ft. long by 100-ft. wide, accommodates an ocean-going tanker and a vessel of the coastal type. No. 2 Dock, 650-ft. long by 180-ft. wide, has berths for two large vessels. Both docks have 30-ft. of water. They lie at an angle to the line of the canal to permit easy access. Ships can be swung in the entrance basin. After a vessel enters one of the docks the entrance is closed by a floating boom and her fires are drawn before pumping operations begin.

The delivery branch of the ship's pump is connected with the fixed oil mains by means of flexible pipes slung in specially constructed cradles. The main discharge pipes pass through a subway under the canal, where they terminate in a pipe manifold connected with the installations of the several companies. Separate sets of pipes are provided for spirit and for heavy oil, the latter being steam heated to assist the flow. Pumping is carried on by the vessel's own plant supplied with steam, through underground pipes, from the company's oil-fired generating plant situated some distance from the docks. Ocean-going ships and coasting vessels may be loaded as well as discharged in either dock.

After pumping operations have ceased the oil or spirit which remains in the pipes is extracted and passed to the receiving tanks by electrically operated deep-well pumps; such vapour as may gather in the subway is removed by electric fans, with an air capacity of over three-quarters of a million cub. ft. per hour, and exhausted at a safe height.

The subway of an internal diameter of 6-ft. is 466-ft. long and passes through sandstone rock 15-ft. below the bed of the canal.

Besides the berthing accommodation provided by oil docks Nos. 1 and 2, there is, at Stanlow, a lay-bye 600-ft. long, on the south side of the canal, which is available for vessels discharging grades of oil not flashing below 73 deg. F. and for shipping by-products.

The oil installations on the south bank cover some 200 acres, and an extensive area has been reserved for future developments. The company's railways serve this area and connect it with the main line systems. It is provided with road connections, and on the water front there are facilities for shipping oil into tank barges, for conveyance on the company's Bridgewater canal and other inland navigations connecting with the ship canal. The discharging capacity of a single pipeline is approximately 600 tons per hour for spirit and 250 tons per hour for heavy oil.

Many Guests at the Opening.

Following the opening of the new oil dock by the Minister of Transport, there was a luncheon on the s.s. "Ryde," which had brought from Liverpool a large body representative of the Manchester Ship Canal Co., the Mersey Docks and Harbour Board, local municipalities, and oil and petroleum companies. Mr. Alfred Watkin, chairman of the Manchester Ship Canal, presided, supported by Lord Colwyn and other directors. The Ship Canal (said Mr. Oliver Stanley) was unique in this or any other country. The Minister declared the dock opened when the "Ryde" broke a tape across the entrance. When the little steamer had backed out again, the first tanker to enter was the "British Duchess," of London, bright with bunting, which discharged part of a cargo of 10,000 tons of petroleum.

Ship Canal Company's Equipment.

The Manchester Ship Canal waterway is 35½ miles long, 30-ft. deep from Eastham to Stanlow Oil Docks, thence to Manchester 28-ft. deep, and is regularly navigated by vessels of 15,000 tons d.w. capacity. The principal docks are at Manchester, but much development has taken place along the waterway, and at several points there are docks and wharves, cargo handling plant and storage accommodation, as well as facilities for coal and oil bunkering. The total length of the quays and wharves is approximately 12 miles; the floor space of the quay sheds totals nearly 90 acres, and that of the warehouse 27 acres. The company's own railways, linking up the port and intersecting the Dock Estates, exceed 200 track miles. They connect with all the main line systems, establishing direct communication between every ship's berth and every railway station in the kingdom; dock cartage is eliminated.

The dock equipment at Manchester includes 52 hydraulic, 44 steam, 126 electric jib cranes, with a radius of from 16 to 40-ft., capable of lifting from one to seven tons to a height from rail level of from 13 to 80-ft.; six electric grab cranes, each of 5 tons capacity (fitted with Priestman's grabs); 16 electric overhead travelling cranes; 36 electric hoists; a floating self-propelling derricking and revolving crane with a lifting capacity of 60 tons; a 30-ton steam crane; a pontoon sheers with a capacity up to 250 tons and a lift of 21-ft.; a coaling crane, manipulating 12-ton wagons, and other modern appliances for quick handling. The equipment includes a fleet of lighters and 6 floating pontoons, each of 800 tons d.w. capacity. Manchester dry docks comprise three graving docks ranging in size up to 535-ft. in length, and there is a pontoon dock with a lifting capacity of 2,000 tons. At Ellesmere Port there are repair yards and a pontoon dock 300-ft. long with a lifting capacity of 4,000 tons. There are established firms who undertake ship repairing but have no dry docks.

Now a J.P.

Mr. A. P. Warner, C.B.E., general manager of the Mersey Docks and Harbour Board, has been made a Justice of the Peace for the City of Liverpool.

Wallasey Foreshore Development.

Wallasey Corporation has taken the first step toward the completion of its £1,000,000 foreshore improvement and development scheme, by the opening of the new marine lake. This is situated between the existing promenade and the new sea defence wall, being constructed at a cost of £275,000. The total estimated cost of the completed promenade scheme from the Perch Rock Battery to a point 300 yards west of Harrison Drive, including the sea wall, premenade, marine lake and bathing pool, is £875,000, and its total length nearly two miles. The section now under construction between Perch Rock Battery and the Red Noses will cost £440,000, and it contains the revenue-producing portion of the scheme. The average number of men employed on the marine lake has been 250. The amount paid for wages has totalled £108,000. It has been necessary in making the lake to excavate 100,000 tons of rock and sand, and 20,000 tons of concrete have been used in constructing the massive walls. The foundations have been carried down to the rock or to the boulder clay base, with the result that the lake is absolutely watertight. The lake has an area of 10 acres and varies in depth to 4-ft. 6-in. in the middle to about 2 or 3-ft. on the east and north sides. It is 340 yds. in length and 110 yds. wide, and holds 11,000,000 gallons of water and can practically be filled or emptied in two or three hours during suitable tides. In addition to providing facilities for boating, the marine lake will also act as a large storage reservoir for settled sea water for supplying the bathing pool, after it has passed through the latest filtering process.

Hull and the Humber

Embargo on Russian Timber Affects Trade at Hull Docks.

THE docks at Hull are less busy than they ought to be at the commencement of the timber import season in consequence of the embargo on Russian timber, shipment of which from White Sea ports and Leningrad is now held up. Numerous cargoes of Scandinavian wood have come to hand, but these would easily have been outnumbered by the Russian had they not been prohibited. Humber importers, as usual, bought very extensively of Russian sawn wood and, not knowing how long the embargo will continue in operation, they have been compelled to turn their attention to Swedish and Finnish productions to cover immediate requirements. The export of coal does not expand, and the excellent appliances the port has for shipment of coal are to a large extent idle. There is, however, a feeling of optimism that an improvement will come as a result of the trade agreements entered into with Scandinavia and other countries, and that the activities of the port will correspondingly increase. The exports of coal to places abroad from the Humber ports for the first nine weeks of the second quarter were 531,518 tons, against 544,377 tons in the corresponding period of 1932. There have been larger imports of wheat, barley, maize and oats, but smaller arrivals of oil seeds and likewise of timber.

Humber Bridge Bill Project.

The announcement by the Minister of Transport that he is prepared to examine schemes for the construction of self-supporting toll bridges with a view to Governmental financial assistance has rekindled the hopes of the promoters of the Humber Bridge Bill that the project may yet be brought to fruition. The Bill, which had for its object the building of a road bridge over the river Humber to connect Hull with North Lincolnshire, had advanced to the third reading stage in the House of Commons, but was not permitted to proceed because of the change made in the financial proposals since its first introduction. The original scheme contemplated a bridge to cost approximately £1,750,000, towards which the Ministry of Transport offered to contribute 75 per cent. Owing to the State of the national finances when the present Government took office, this offer was withdrawn, whereupon the Hull Corporation substituted proposals to meet the cost by the flotation of a loan of £1,900,000, the expenditure to be recovered by means of tolls. This, however, was rejected, and a modified scheme was presented by Sir Douglas Fox and Partners whereby the cost would be reduced to £1,500,000. The Bill was very strenuously opposed by the Humber Conservancy Commissioners and shipping interests on the ground that the navigable channel of the river would be jeopardised; and by the Aire and Calder Navigation and others interested in the Port of Goole, who feared that the damage might lead to the closing of that port. Very heavy expenses were incurred on both sides, and when the Bill was withdrawn, much to the satisfaction of those responsible for the river, the Hull Corporation decided to defer further action for the present but to give consideration to the matter in the event of the Government changing the policy with respect to unemployment relief works. Notwithstanding the strength of the opposition that would have to be met with again were the Bill revived, there is a considerable volume of public opinion in favour of the project on the triple ground that a bridge is urgently needed to improve transport facilities and means of communication between the East Riding of Yorkshire and Lincolnshire, that it would give a fillip to engineering at a time when the industry is slack, and that it would provide work also for unskilled workers.

Progress of the New Dock at Grimsby.

Work on the new dock under construction at Grimsby is making good progress, and it is contemplated that it will be ready for general traffic by the end of next year. The scheme is designed to add 37 acres to the water area of the port, and by taking in No. 1 Dock of 13 acres will provide a splendid new dock of 50 acres for the additional accommodation of the fishing industry. The project is the joint undertaking of the Grimsby Corporation and the London and North-Eastern Railway Co. The main contract was placed in 1930, since when excavation and reclamation of the foreshore have proceeded without interruption. The greater proportion of the material excavated is being deposited behind a new river wall or embankment to the east of the site of the dock, where a large area has been reclaimed, on which coal sidings will be laid and sites for industrial purposes prepared. An entrance lock from the Humber is being constructed 40-ft. wide and 204-ft. long, with three pairs of lock gates of timber and equipped with the necessary sluices and operating machinery. Outside the new lock the existing entrance channel will be widened and a new east pier constructed of timber. On the west side a short middle pier involving the demolition of most of the old east pier is being built. On the north side of the dock itself there will be a reinforced quay 2,000-ft. long and on the south another about 460-ft. long. West of the latter, two outfitting quays of reinforced concrete 397 and 266-ft. long, projecting into the dock, are being constructed, and beyond these will be three slipways to serve a shipyard for the accommodation of 10 steam trawlers and provided with side-slipping arrangements on the system patented by Henderson and Nicol, of Aberdeen. The east end of the dock will be given up to coaling purposes, three short jetties jutting out into the dock for the accommodation of six trawlers at a time, and provision made for a fourth jetty, should it become necessary at a future time. At the west end the quay will be approximately 500-ft. long. On the land side a concrete overbridge across the L.N.E.R. main lines and sidings west of New Clee Station has been built and is now practically ready with the approaches from Humber Street.

Before the excavation for the new dock could proceed it was necessary to cut off the entire site of about 175 acres from the sea by a raised embankment 1¼ miles in length and also to direct the Grimsby main sewer and storm water outfall as well as the discharges from Nos. 2 and 3 graving docks, all of which emptied into an open channel which flowed right across the site. During the construction of the embankment a considerable quantity of chalk stone of which it is constructed was washed away and damage done to the contractors' plant, but no serious breach of the embankment itself occurred. The completion of the tipping of the embankment practically coincided with the completion of the sewer and an attempt to close the embankment at the outfall channel was made at the end of April, but was unsuccessful. A controlled sluice channel was then driven through a short distance away and the bank was finally closed at the end of May. While this work was being carried out a steel pile and chalk dam was constructed across the outer end of the new lock entrance, and the lock area itself enclosed in a box of steel piling so that the trenches for the lock walls could be excavated as soon as the tide was excluded from the site by the closure of the river embankment. Inside the dock, quay design had to receive careful reconsideration owing to the soft nature of the ground. New designs were therefore prepared and the South Quay is now practically finished, while the North Quay has been more than half completed. Work in connection with slipways and slipway yard is about finished, and a contract for the cradles, traversers and operating machinery is about to be placed. The outfitting jetties are well in hand and work on the coaling jetties will soon be commenced.

Repairs to North Pier, Bridlington, not yet completed.

Hopes that the extensive repairs to the North Pier at Bridlington (East Yorkshire) undertaken by the Bridlington Harbour Commissioners, would be completed by Whitsuntide were not realised, but the pier was accessible in part to thousands of holiday-makers who visited the resort during the week-end. The work, the estimated cost of which is £1,200, has been delayed considerably by unfavourable tides, but is being done as quickly as possible. The pouring of liquid cement into the cracks in the stonework can only be done at certain times, work being restricted to four hours out of the 24. The new staging running along inside the pier for the accommodation of pleasure craft has been completed.

Immingham Dock Statistics.

During the month of May a total of 107 vessels representing a net registered tonnage of 134,216 used Immingham Dock, including 18 vessels totalling 30,064 net registered tons using the Western Jetty coaling berth, as compared with May, 1932, when 107 vessels totalling 137,793 net registered tons used the port, including 26 vessels totalling 34,081 net registered tons using the Western Jetty.

Contracts Awarded.

Amongst recent orders placed, Messrs. The Concrete Proofing Co., Ltd., of London, have obtained an order from the Preston Corporation Waterworks Department for the interior lining in reinforced Gunite of a section of the Langden Aqueduct, near Longridge; also from the Blyth Harbour Commission for the Gunite encasement of timber piling in the coal staiths, Blyth.

Ferry Escalator Impracticable.

The chairman of the Wallasey Ferries Committee has stated that the suggestion of an escalator being placed at Seacombe Ferry is impracticable, and such a scheme was considered by the committee as far back as 1928. At present they were considering other methods of dealing with the problem of facilitating the clearance of passengers from the landing stage.

The Port of Buenos Aires : C

By PEDRO L Civi

Southern Outerport. South Basin and to th

THE City of Buenos Aires, Federal Capital of the Argentine Republic, is situated on the right-hand side of the River Plate (latitude South 34 deg. 36 mins. 30 secs., longitude West of Greenwich 58 deg. 22 mins. 14 secs.), where it has a width of about 45 kilometres (28¼ miles). Its area is 187 sq. kilometres, with a frontage to the north-east on the River Plate of 14 kilometres (8¾ miles), limited on the south by the Riachuelo to a length of 13 kilometres (8⅛ miles), of which the first 3 kilometres (1⅞ miles) are employed for overseas navigation.

Its population is 2,173,000 inhabitants (year 1931), which represents 19 per cent. of the total population of the republic.

The principal communications with the interior of the republic are the railways, which extend their zone of activity westwards 1,000 kilometres (625 miles) to the Province of Mendoza, San Juan and San Luis; southward some 400 kilometres (250 miles), principally in the Province of Buenos Aires and, northward, to the provinces of Cordoba, part of Santiago del Estero, Tucumán, etc.

The railways with access to the City of Buenos Aires are all owned by private companies, and the track which has been chiefly adopted is of 1.676 metres, although there are also tracks of 1.435 metres and 1.00 metres.

The network of roads which converge on the city, although not of the same importance as the railways, are being gradually extended, those worthy of special comment being the roads to Rosario, 324 kilometres (202½ miles), Luján, 60 kilometres (37½ miles), Esteban Echeverria, Tigre, 40 kilometres (25 miles), La Plata, 60 kilometres (37½ miles), etc.

As the Rio de la Plata is the mouth of the rivers Paraná and Uruguay, both navigable to a great extent, the City of Buenos Aires therefore communicates by water with the republics of Paraguay and Uruguay, with the provinces of Santa Fé, Entre Rios and Corrientes, and with the Governments of Chaco, Formosa and Misiones.

Description of the Port

Entrance Channels.

Vessels arriving from sea to enter the Port of Buenos Aires follow a buoyed channel of 106 kilometres (66¼ miles), which has a depth varying from 8.23 metres (27-ft.) to 10.06 metres (33-ft.). This channel is named " Punta de Indio " and commences in the pontoon Recalada, situated some 30 kilometres (18¾ miles) from the Port of Montevideo, and continues from the Banco Chico channel as far as the Outer Roads, situated in front of the Port of La Plata, which is some 57 kilometres (35⅜ miles) from that of Buenos Aires.

The Entrance Channels commence from the Outer Roads to a distance of 37 kilometres (23⅛ miles), with a bottom width of 100 metres (328-ft.) and a depth varying between 9.15 metres (30-ft.) to 9.46 metres (31-ft.), all being perfectly buoyed. At some 10 kilometres (6¼ miles) approximately from the port this channel divides into two; the North Channel terminates in the North Basin and the South Channel in the South Basin.

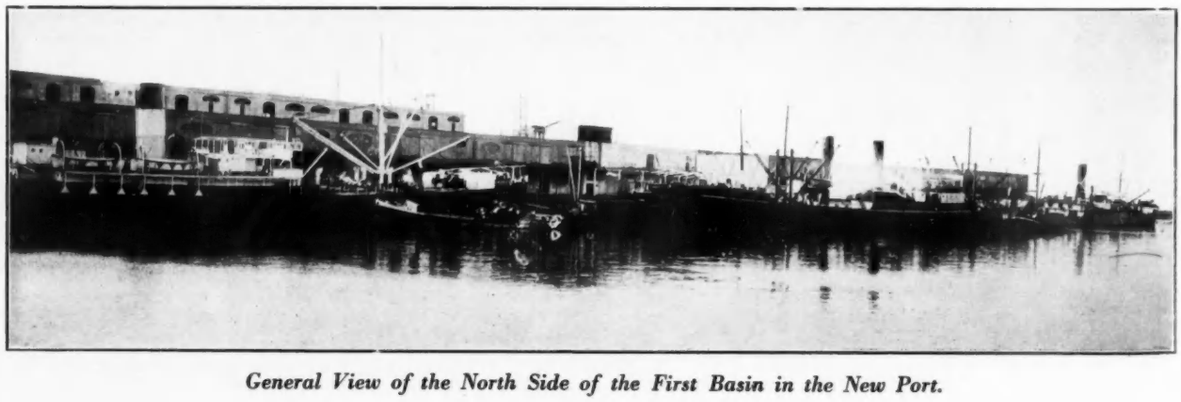
The North Channel has a depth of 9.15 metres (30-ft.) to 9.45 metres (31-ft.), whilst the South Channel has only 8.23 metres (27-ft.). The Northern outer port communicates with the North Basin and the entrance channel which links up with all the basins of the New Port (see supplement). The Southern outer port is the zone where the Riachuelo, Southern Dock and South Basin meet.

The North and South Basins, together with the four basins situated in line, and named Docks Nos. 1, 2, 3 and 4, constitute what is known as the Madero Port.

The up-river navigation from Buenos Aires is also effected by buoyed channels; the most important, viz., that which is used by shipping to reach the ports of Rosario and Santa Fé, part of the outer roads and approaching the eastern coast of the river, continue in the arms of the extensive delta which is formed by the Paraná as it flows into the River Plate.

Riachuelo.

The oldest part of the Port of Buenos Aires comprises the first 4 kilometres of the North Shore of the Riachuelo, to-day modernised with wharves of reinforced concrete in nearly the whole of its length, constructed to permit of a maximum weight of 3,000 kilos per square metre and dredged to a depth of 8.23 metres (27-ft.). The South Shore has not the same importance; it has wooden wharves of a length of only 1,200 metres (3,936-ft.). As this part of the river curves considerably, it has been necessary to rectify it so as to facilitate navigation, so that in the portion actually utilised by navigation it has only two pronounced curves, these being named " Vuelta de Rocha " and " Vuelta de Badaracco," and another, less pronounced, the



General View of the North Side of the First Basin in the New Port.

C Port of the Argentine Republic

RO I Civil Engineer

in and to the left of passage and South Dock.

" Vuelta de Berisso." The average width is 100 metres (328-ft.) and the depth 7.93 metres (26-ft.)

The streets alongside have a width of from 30 to 40 metres (98½-ft. to 132-ft.); the north side is paved with granite blocks, but the south side is principally unpaved. The communication for vehicular and foot traffic between both banks is effected by means of three transportation bridges and an hydraulic bridge, which is called the Puéyrredón Bridge; the last named practically constitutes the limit of the navigable portion for overseas vessels.

Along the banks of the Riachuelo the Government do not possess cranes or railway tracks. The warehouses and other installations are exploited by private concerns. In this zone there are installed warehouses for native products, cold storage depots, and warehouses for imported producfs for direct transport, such as timber, iron, cement, tiles, etc. On the south side and close to the " Vuelta de Rocha," sawmills have been installed and yards which undertake repairs to barges and other small vessels.

Above the Pueyrredón Bridge, the Riachuelo permits the navigation of barges, and on this section there are installed a great number of workshops allied to the export and import trades; some of the railways also have stations there for goods despatch, which are linked together by means of lighters.

Madero Port.

This port, the construction of which was commenced in the year 1890, is the most modern part of the present overseas port and embraces, as we have stated, the two North and South Basins and Docks Nos. 1, 2, 3 and 4.

The North Basin has the form of an irregular pentagon, with a depth of from 30 to 32 feet (9.15 metres to 9.76 metres) and an area of 154,000 square metres (184,184 square yards), and 1,405 metres (4,608-ft.) of wharves.

Owing to the excellent depth of water, the North Basin is exclusively reserved for passenger liners, and for this reason there is installed there the necessary equipment for the embarkation and disembarkation of passengers.

For the storage of merchandise this basin has six single-storey galvanised iron sheds with a net capacity of 26,800 cubic metres (946,308 cubic feet) and a warehouse of brick and concrete construction having 4 floors and a cellar, with a net capacity of 22,300 cubic metres (787,413 cubic feet).

No. 4 Dock is contiguous to the North Basin and separated from it by a lock 197 metres long (646-ft.) by 25 metres (82-ft.) wide, with a depth of 7.32 metres (24-ft.) provided with two pairs of gates; likewise, a swing bridge serves as communication between both sides. This dock is 630 metres (2,066½-ft.) long, 160 metres (525-ft.) wide, and a depth of 7.32 metres (24-ft.), with a total length of wharves of 1,530 metres (5,078½-ft.). On the west side, facing the wharves, are 4 sheds, each of 4 floors and 1 cellar, with a total capacity of 111,300 cubic metres (3,930,003-ft.).

On the east side there are 4 groups, each one constituting a shed of 2 floors and one warehouse of 4 floors and a cellar, which have a total net capacity of 139,500 cubic metres (4,925,745 cubic feet).

No. 3 Dock follows No. 4, separated by a canal 74.36 metres (244-ft.) long by 20 metres (66-ft.) wide, with a depth at entrance of 7.20 metres (23½-ft.), also provided with a swing bridge.

No. 3 Dock is 690 metres long (2,263¼-ft.), 160 metres (525-ft.) wide, and has a depth of 7.32 metres (24-ft.) with 1,660 metres (5,444¾-ft.) of wharfage. The east side is reserved for imports and, facing the wharves, there are 5 warehouses of brick and concrete, each with 4 floors and 1 cellar, with a capacity of 114,800 cubic metres (4,053,588-ft.). The west side is reserved for exports, but here the Government only exploits the wharf cranes; the rest is private.

There are installed here two important granaries and elevators; one the property of the Flour Mills Elevator Co., which has a bulk capacity of 50,000 tons and 32,000 tons in bags; the other, the Continental Export Co., has a bulk capacity of 4,300 tons and 12,000 tons in bags.

No. 2 Dock is separated from the former by a channel 60 metres long by 20 metres wide (197-ft. by 66-ft.), with a depth at entrance of 7.20 metres (23½-ft.), with a swing bridge. Its characteristics are as follows: 570 metres (1,869½-ft.) long, 160 metres (524¾-ft.) wide, depth 7.34 metres (24-ft.), and a total length of wharves of 1,420 metres (4,657½-ft.).

As in No. 3 Dock, the west side is reserved for imports, for which purpose it has 4 warehouses, two of 3 floors and cellar with a total capacity of 73,400 cubic metres (2,591,754 cubic feet), and the other two of 4 floors and cellar with a total capacity of 45,000 cubic metres (1,588,950 cubic feet.).

The east side is wholly reserved for grain exports; the following concerns are established here, with granaries and grain elevators: the Central Argentine Railway, with a bulk capacity of 28,000 tons and 27,000 tons in bags; the Model Grain Co.,

North Basin—Entrance Channel and Outerport. New Port to the left of the North Stream Lock.

The Port of Buenos Aires—continued

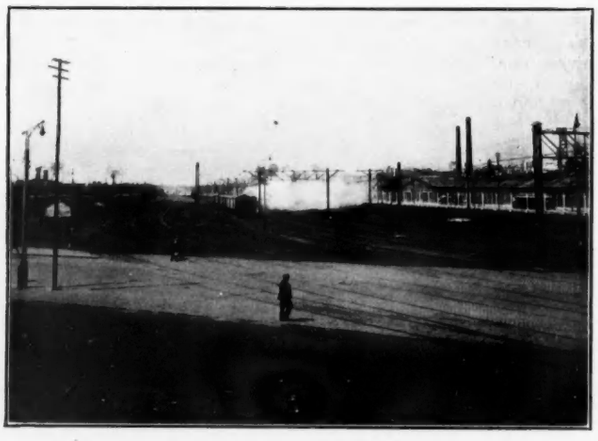
General view of the West side of the South Basin, showing the Power Station of the Italo-Argentine Electricity Company on the right.

with 7,000 tons and 12,000 tons respectively; Bantle, De Lorenzo, Firpo, with 6,000 tons and 6,000 tons respectively; also Bunge Born Co., Ltd., have installations for depositing 3,000 tons in bulk and 12,000 tons in bags.

No. 1 Dock follows No. 2 Dock and is separated by a channel 80 metres (262-ft.) long, 20 metres (65½-ft.) wide, and 7.20 metres (23½-ft.) deep, provided with a swing bridge. Its characteristics are: Length, 570 metres (1,869½-ft.); width, 160 metres (525-ft.); depth, 7.32 metres (24-ft.), with a total length of wharves of 1,420 metres (4,657½-ft.).

The west side is reserved for imports and has 4 warehouses, two of 3 floors and cellar, with a total utilisable capacity of 73,500 cubic metres (2,595,285 cubic feet), and two of 4 floors and cellar with 45,000 cubic metres (1,588,950 cubic feet) of useful capacity; also on the south side there is an iron shed with wooden floor of 12,300 cubic metres (434,130 cubic feet) capacity.

The installations on the east side are reserved for exports; amongst these should be mentioned the grain silos and elevators of the Model Grain Co., with a capacity of 17,500 tons in bulk and 8,000 tons in bags, and the installations of the State Railways.



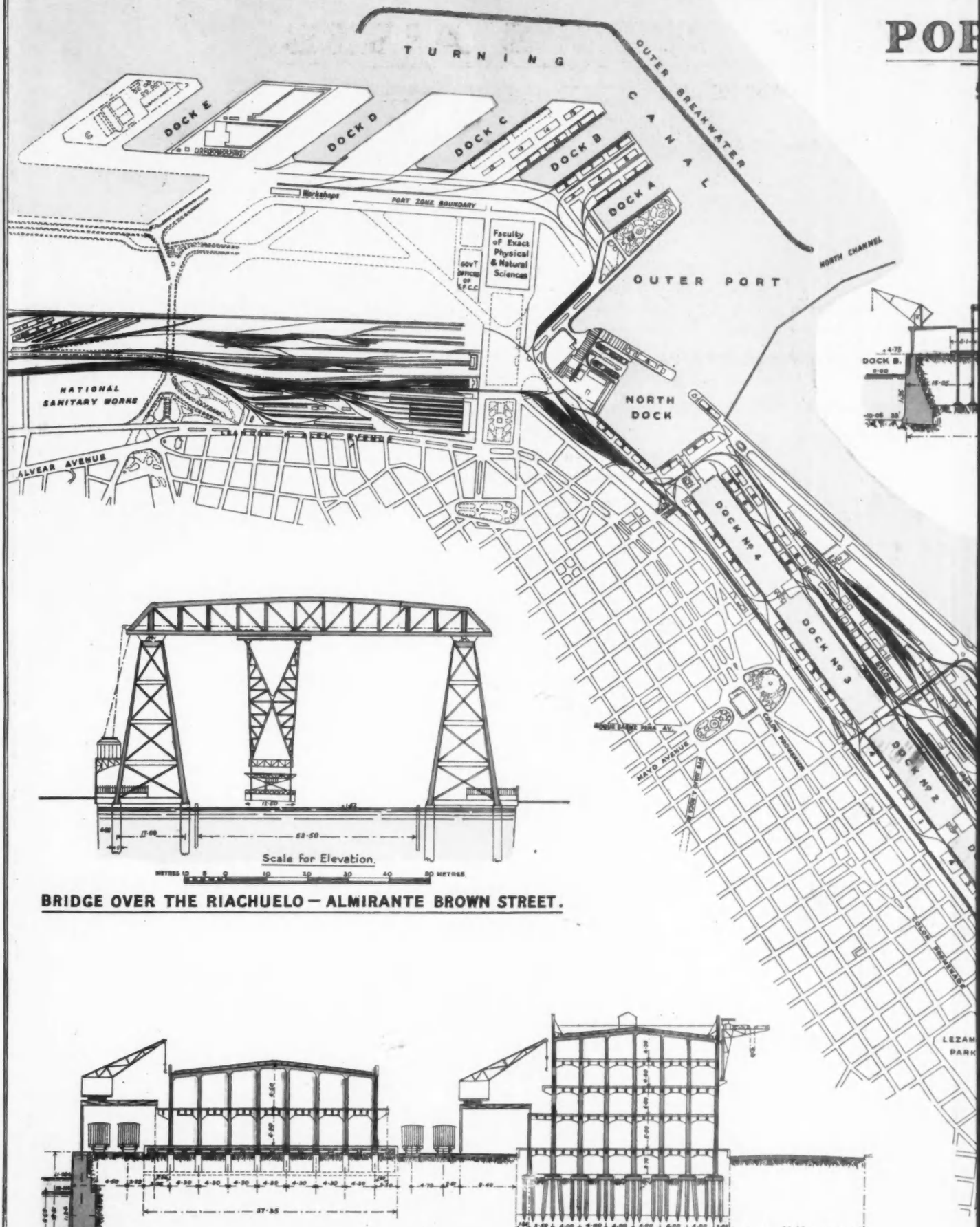
General View of the North Junction of the railways entering the Port.

Between Nos. 1 and 2 Docks, at some 300 metres to the east, the Government disposes of storage for imported products with 6 one-storey warehouses, shown on the Supplement under letters A, B, C, D, E and F, with a total capacity of 56,000 cubic metres (1,977,360 cubic feet).

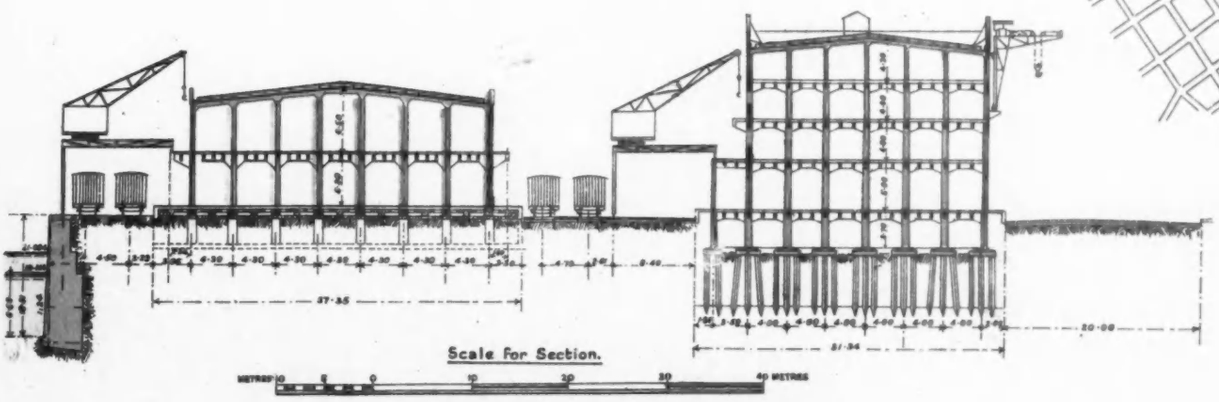
No. 1 Dock is connected to the South Basin by a channel 184 metres long (601½-ft.), 20 metres wide (65½-ft.), with a

The "Modern Granaries Company" Grain Elevators on the East side of No. 1 Dock.

POR



BRIDGE OVER THE RIACHUELO — ALMIRANTE BROWN STREET.



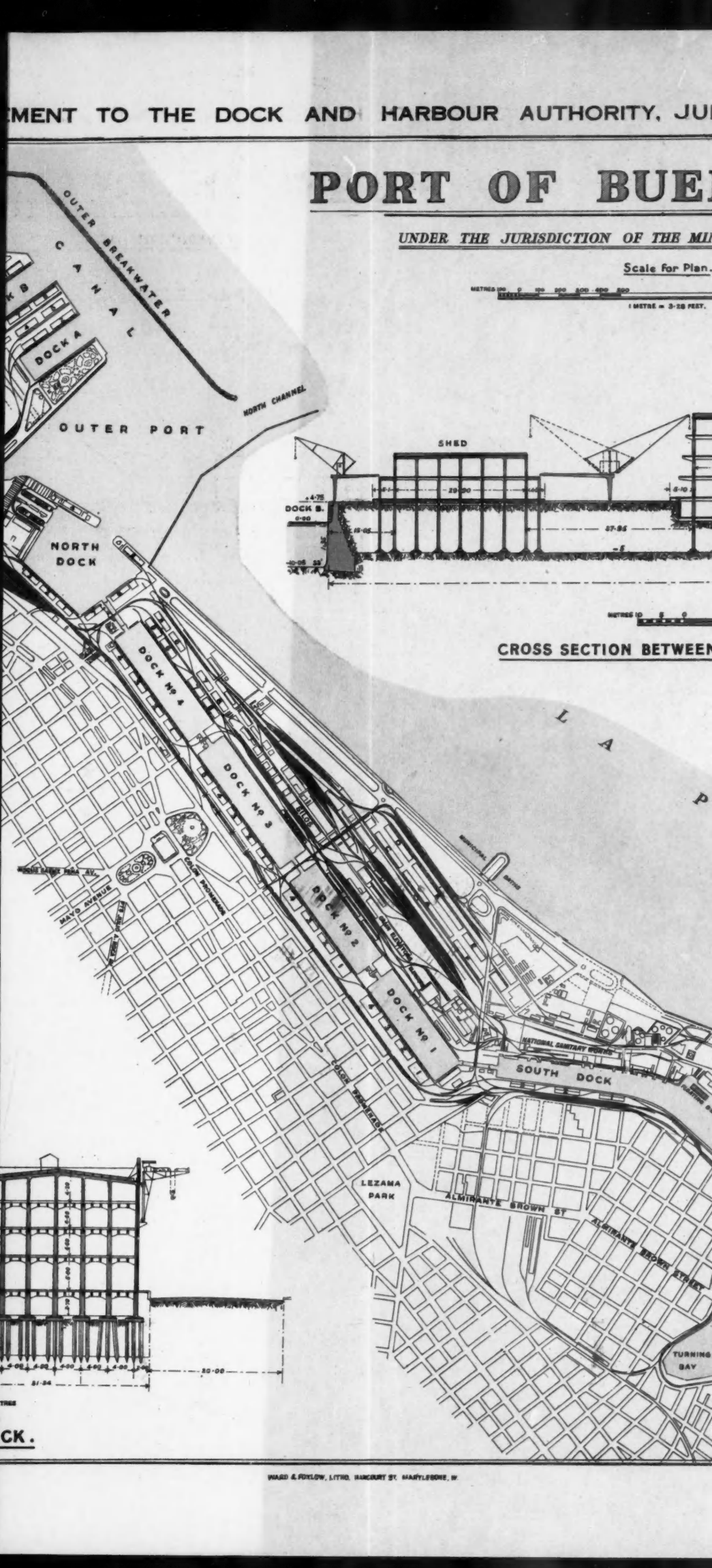
CROSS SECTION OF EAST SIDE OF Nº 4 DOCK.

WARD & FOYLOW, LITHO, HANGRAVE

PORT OF BUE

UNDER THE JURISDICTION OF THE MI

Scale for Plan.



WARD & FOXLOW, LITHO. HANDBURY ST. MARYLEBONE, W.

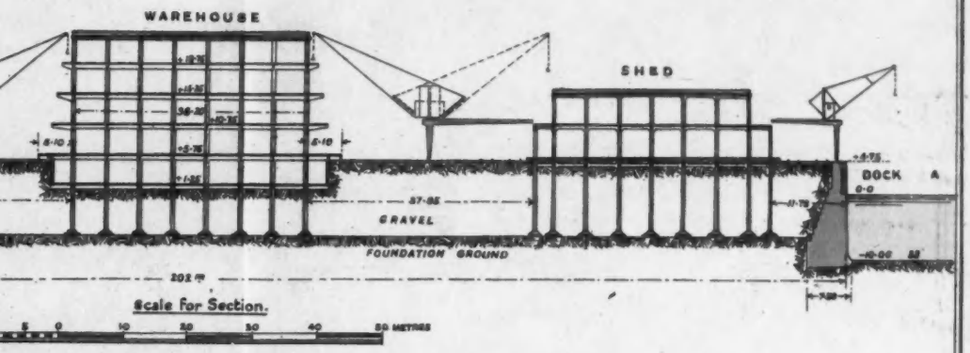
UENOS AIRES.

THE MINISTRY OF PUBLIC WORKS.

ale for Plan.

1500 1500 METRES

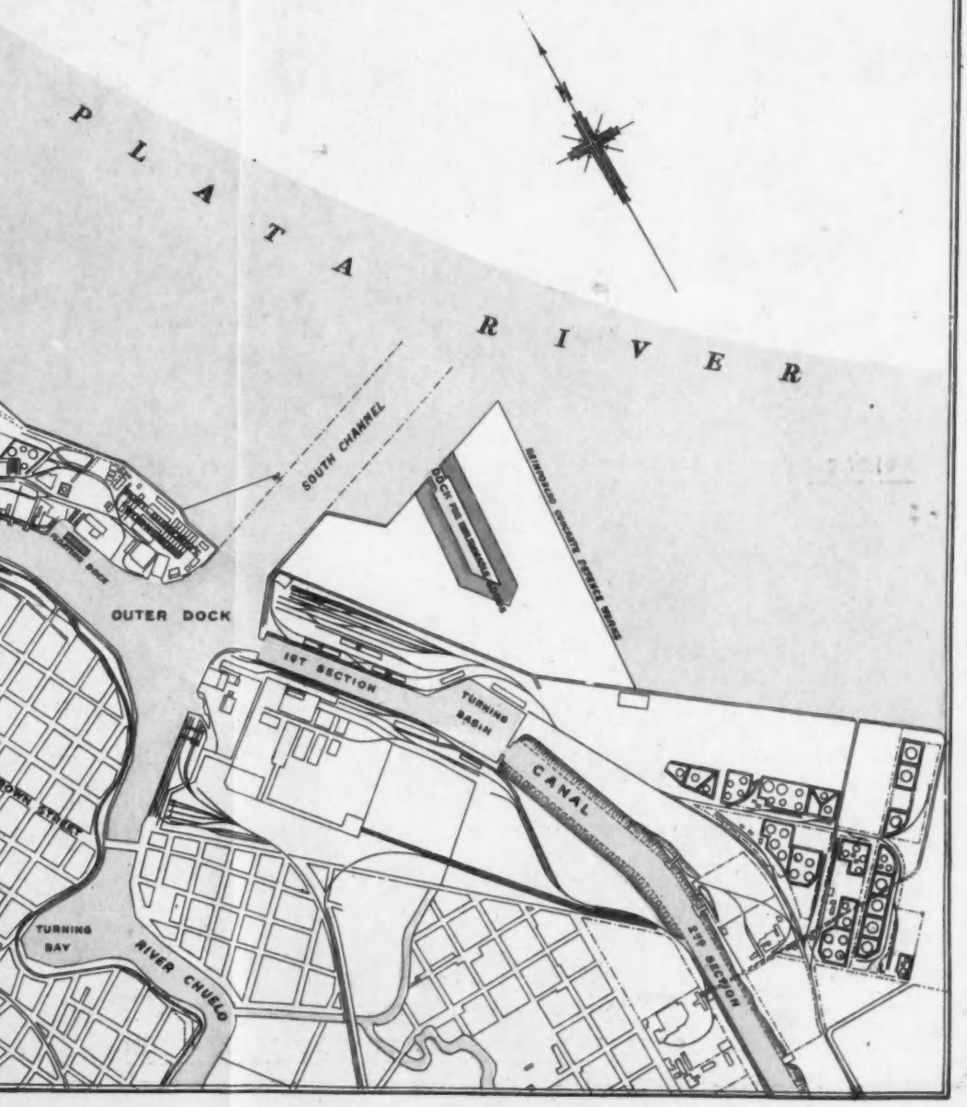
TRE = 3·28 FEET.

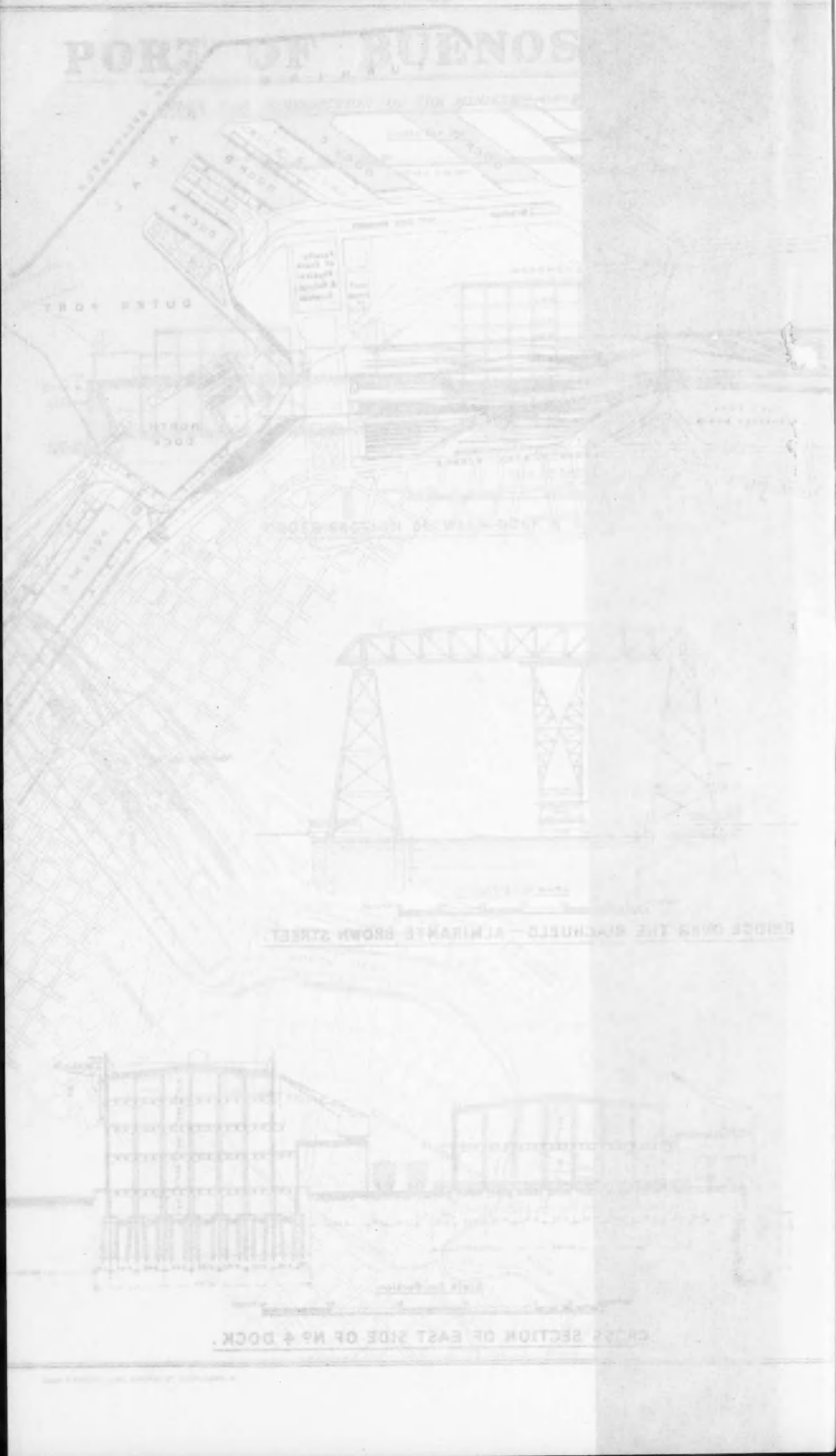


Scale for Section.

0 10 20 30 40 50 METRES

BETWEEN DOCK A. & DOCK B. — NEW PORT.





The Port of Buenos Aires

Riachuelo—The Rocha curve.

Partial view of the Riachuelo, between the Scherzer Bridge, which belongs to the Great Southern Railway and the Justo Jose de Urquiza Bridge.

The Port of Buenos Aires—continued

depth of 6.70 metres (22-ft.). The channel has 3 pairs of gates and 1 revolving bridge.

The South Basin has a length of 1,050 metres (3,444-ft.), an average width of 110 metres (361-ft.), and a depth of 6.70 metres (22-ft.), with a tying-up wharf on the west side, which is specially reserved for river navigation.

The east side of the South Basin comprises a rampart covered with flat granite stones, with some small protecting wooden piers, some belonging to the Government for the unloading of materials destined for distribution to its several departments, such as the Fiscal Petroleum Deposit, Public Works Department, Ministry of Marine, etc.; others belong to private concerns who import coal, such as Wilson and Co., Pacific Railways, etc.

In the south outer port the Ministry of Public Works has important workshops, with wharves, sheds, etc.; these are specially reserved in connection with the dredging and buoying of the River Plate.

South Dock.

Towards the south of the Riachuelo adjoining the south outer port, a port extension has been constructed which is exploited by the South Dock Co., as per a Law of the 19th October, 1888, which was conceded for a term of 60 years.

The South Dock consists of two sections; the first has the following characteristics: 913 metres (2,994½-ft.) in length, with a width of 91.70 metres (300¾-ft.) in the first 600 metres (1,968-ft.)—it widens afterwards in a turning basin; the depth is 8.23 metres (27-ft.). It has 1,190 metres (3,903-ft.) of wharves with stone facing on the east side and 910 metres (2,985-ft.) of wood and concrete wharf on the west side. The second section is formed by a channel 2,000 metres (6,560-ft.) long and 100 metres (328-ft.) wide, with a depth of 8.54 metres (28-ft.).

The South Dock is intended for both imports and exports; in the first section there is the Anglo Cold Stores, and in the second, apart from Electric Light and Power Stations of the Chade and Western, and Southern Railways, the Grain Storage such as the Argentine Warrants and Storage Co., which are characteristics of this zone, there are installed petrol storage distillation plants which occupy an area of some 200 hectares. The storage plant consists of 113 tanks for liquid fuel with a capacity of 480,800 tons.

For the storage of sundry merchandise, in the first section of the South Dock, there are 6 sheds of 1 storey and one of 2 storeys, with a total capacity of 44,000 cubic metres (1,553,640 cubic feet).

New Port.

The most modern part of the Port of Buenos Aires is that named the New Port, which extends northwards from the North Basin and comprises 6 basins with a depth of 10 metres (33-ft.). (See Supplement.)

The A basin has a length of 365 metres (1,197-ft.) and a width of 140 metres (459-ft.), with 870 metres (2,853½-ft.) of wharfage. Between this basin and the North Basin there is a space to be laid out with gardens.

The B Basin follows the A Basin, and has a width of 140 metres (459-ft.), 525 metres (1,722-ft.) long on the north side, and 464 metres (1,522-ft.) on the south, and has a length of 1,165 metres (3,821-ft.) of wharves. Between this basin and the A Basin there is a width of 202 metres (662½-ft.) which is occupied by two warehouses on the north side with a capacity of 70,700 cubic metres (92,475.6 cubic yards). There are also three warehouses in the centre, each of 4 floors and cellar, with a total capacity of 104,000 cubic metres (136,032 cubic yards). All these warehouses have been specially constructed for imports.

The C Basin is 140 metres (459-ft.) wide, 495 metres (1,624-ft.) long on the north side, and 585 metres (1,919-ft.) on the south side, with a length of 1,284 metres (4,211½-ft.) of wharves. The area enclosed between Basins B and C is at present occupied by 3 sheds of 2 floors on the north side with a capacity of 42,400 cubic metres (55,459 cubic yards), and four sheds of 4 floors and a cellar with a capacity of 129,800 cubic metres (169,778½ cu. yds.). There still remains to be constructed two sheds facing the C Basin. All these sheds have been built with a view to being utilised for imports.

The D Basin was designed for grain exports; it is 150 metres (494-ft.) wide, 495 metres (1,624-ft.) long on the north side, 585 metres (1,919-ft.) on the south, with a length of 1,300 metres (4,264-ft.) of wharves.

The land between the C and D basins is 240 metres (787-ft.) wide, and up to the present the projected granaries and elevators have not been installed owing to the depression from which the country is at present suffering.

The land between basins D and E is 390 metres (1,279-ft.) wide, of which 240 metres (787-ft.) is occupied by the Electric Power Station Chade, this being one of the private companies furnishing electric light and power to the city. The port operations of this company are carried out on the wharves which they possess on the E Basin, which has the same characteristics as the D Basin. On the land adjacent to Basin E the superpower station of the Ciae is installed, this being the other electric light and power station which serves the city. This land has a width of 279 metres (915-ft.).

General view of the East side of No. 2 Dock, used exclusively for grain exports.

The Port of Buenos Aires—*continued*

The New Port terminates at the north end in a basin for coasting vessels, which is at present under construction and which will have a length of 800 metres (2,624-ft.) and a width of 240 metres (787-ft.)

Equipment

Dry and Floating Docks.

The Port of Buenos Aires possesses, for repairing and docking of vessels, two docks situated on the north side of the North Basin: one 150 metres (492-ft.) in length, and the other of 180 metres (570-ft.), with equal widths of 20 metres (65½-ft.) at the entrance and 27.92 metres (91½-ft.) at the crown, with a height of 10.85 metres (35-ft.) at the entrance, and at a distance of 50 metres (164-ft.) one from the other. The pumping plant consists of 2 vertical centrifugal pumps, worked by two 250 h.p. motors. For the same service there is also a floating dock for vessels up to 4,000 tons, which is stationed in the South Basin.

Cranes and Hoists.

For the handling of merchandise the Government possesses the following: Three floating cranes of 25, 60 and 100 tons respectively; 111 hydraulic cranes installed on the wharves, these being one of 35 tons, two of 15 tons, one of 10 tons, one of 5 tons, twenty of 2½ tons, and the remainder of 1½ tons; 24 hydraulic cranes of 1½ tons installed on the land side of the sheds; 111 electric cranes of 3 tons on the wharves; 24 of 4 tons, 24 of 2½ tons, and one of 20 tons; 227 electric cranes installed in the sheds and warehouses, and used for loading and unloading trucks; 17 steam cranes in the space between the sheds. Private firms have a total of 245 cranes, with a total capacity of 898 tons, which together with the 539 Government cranes of 1,521 tons makes a total in the whole of the port of 784 cranes with a total capacity of 2,419 tons.

Storage.

In the general description of the port it will be seen that the Government disposes of plant for the storage of merchandise, the total capacity of which reaches 1,080,497 cubic metres (38,152,349 cubic feet or 1,413,290 cubic yards). To this should be added the private warehouses in the South Dock, those installed on either bank of the Riachuelo, the Las Catalinas Co., etc., which have a total capacity of 679,500 cubic metres (23,993,145 cu. ft.), without taking into account granaries, for the storage of cereals, mentioned in the general description, the total capacity of which is 225,000 tons.

Railway Lines.

The railway installations in the port are state property. Private companies deliver or receive the wagons at two branch stations, the North and the South, when dealing with broad gauge traffic; the narrow gauge does not enter the port and receives or delivers merchandise at a transhipment station, owing to the port service being for broad gauge only.

In the port service the Government have 37 steam locomotives and 5 Diesel electric locomotives, 560 wagons and 118 kilometres of track.

In addition, the Central Grain Market and the "La Catalina Co." have their own rail installations, as also has the "South Dock," in which the company which exploits it is commercially connected with the Great Southern Railway.

Organisation of the Port Services

The various services of the port are under the direct orders of the Ministeries of Finance and Public Works. The Custom House depends directly on the first mentioned, apart from its own activities, that is to say, the recovery of import and export dues, and also the storage, slingage and similar services.

The Ministry of Public Works, with the co-operation of the General Director of Navigation and Ports, is the agent for the execution of new works and installations, the up-keep and maintenance of all entrance channels and everything inside them, the buoying and lighting services, the control of all private properties within the port limits, and dock clearing, etc.

To the Ministry of Marine belongs the port police service, under the Prefect of Marine, that is to say, the Comptroller in the navigation of the canals and in the interior of the port.

The Ministry of the Interior specially controls all sanitary matters by means of the National Department of Hygiene, which is in charge of sanitary visits to vessels from overseas, of disinfection, of the fumigating station for rats, etc., etc.

The Ministry of Agriculture controls the export of grain and meat, live cattle, etc.

Traffic at the Port

The Port of Buenos Aires absorbs approximately 37 per cent. of the entire exports and 77 per cent. of the entire imports of the republic. To give a precise idea of its importance, Table No. 1 details the commercial value for each year of the last 10 years.

With respect to the movement of vessels, the figures for the last 10 years are given in Table No. 2.

With the object of showing the position which the Port of Buenos Aires occupies with regard to the largest ports in the world, the following table has been prepared showing figures for the year 1930:—

No.	Port	Net Tonnage
1	New York	43,490,368
2	London	29,632,914
3	Rotterdam	25,752,041
4	Kobe	24,915,302
5	Hamburg	22,067,977
6	Hong Kong	20,264,647
7	Antwerp	19,445,636
8	San Francisco	19,193,905
9	Shanghai	18,524,104
10	Liverpool	16,931,869
11	Philadelphia	16,802,782
12	Singapore	15,908,687
13	Los Angeles	15,311,554
14	Marseilles	15,040,023
15	Boston	14,785,611
16	Buenos Aires	14,182,856
17	Osaka	13,432,561

COMMERCE AT THE PORT OF BUENOS AIRES—TABLE No. 1.

	VALUE OF COMMERCE			TONNAGE OF COMMERCE		
Year	Imports Dollars	Exports Dollars	Total Dollars	Imports Tons	Exports Tons	Total Tons
1921	620,790,989	579,408,397	1,200,199,386	2,595,024	3,040,856	5,635,880
1922	671,699,108	640,885,234	1,312,584,342	3,117,217	3,935,361	7,052,578
1923	863,774,560	671,967,868	1,535,742,428	4,599,561	3,522,744	8,122,305
1924	1,068,052,749	854,622,517	1,922,675,266	5,481,951	4,022,909	9,504,860
1925	1,209,421,621	731,001,721	1,940,423,342	4,968,735	3,304,690	8,273,425
1926	1,242,248,154	696,774,500	1,939,022,654	5,489,235	4,169,117	9,658,352
1927	1,314,042,629	839,234,831	2,153,277,460	6,130,724	5,724,922	11,855,646
1928	1,509,283,038	868,464,726	2,377,747,764	7,153,492	5,319,825	12,473,317
1929	1,511,517,639	744,921,688	2,256,439,327	6,993,777	4,689,356	11,683,133
1930	1,292,214,341	521,077,520	1,813,291,861	6,583,397	3,265,743	9,849,140
1931	956,054,629	497,165,113	1,453,219,742	4,780,273	5,107,281	9,887,554

STEAMERS AND SAILING VESSELS ENTERED—TABLE No. 2.

	FROM ABROAD		FROM THE INTERIOR		TOTAL	
Year	No. of Vessels	Registered Tonnage	No. of Vessels	Registered Tonnage	No. of Vessels	Registered Tonnage
1921	5,128	6,042,675	4,586	1,639,665	9,714	7,682,340
1922	5,924	7,293,650	4,938	2,055,069	10,862	9,348,719
1923	6,679	8,590,394	6,255	2,502,624	12,934	11,093,018
1924	7,015	9,182,399	6,327	3,277,499	13,342	12,459,898
1925	7,087	8,807,997	6,307	3,181,898	13,394	11,989,895
1926	7,138	8,973,478	6,443	3,073,304	13,581	12,046,782
1927	8,424	10,506,371	7,581	4,143,286	16,005	14,649,657
1928	9,243	11,106,890	8,360	3,990,779	17,603	15,097,669
1929	9,839	11,629,032	6,217	3,580,774	16,056	15,209,806
1930	9,149	11,109,543	6,198	3,073,313	15,347	14,182,856
1931	7,951	10,118,462	7,506	4,364,676	15,457	14,483,138

The Port of Buenos Aires—continued

The railway movement is also particularly important in the Port of Buenos Aires, as can be seen by the following:—

Year	Goods Transported Tons	No. of Waggons
1921	3,262,719	178,226
1922	3,701,275	188,529
1923	3,595,297	192,026
1924	4,355,242	209,292
1925	3,619,100	194,007
1926	4,124,654	194,885
1927	5,152,806	236,059
1928	4,698,550	222,990
1929	4,413,773	196,132
1930	3,493,576	169,357
1931	4,157,632	175,792

Port Dues.

In addition to the navigation charges which are paid in the Argentine, vessels entering the Port of Buenos Aires also pay the following dues:—"Entrance," "Permanency" and "Wharf": the first is $0.30 gold per registered ton or fraction of same, the second is $0.10 gold per day per 10 tons or fraction thereof, and the third is $0.20 gold per day for each 10 tons of registered tonnage or fraction of 10 tons.

In the law stipulating these dues, rebates are contemplated for vessels under the national flag, for those entering in ballast, etc.; and in the wharf dues, according to the position they occupy when tied up.

Merchandise pays the following dues:—"Crane," "Storage," "Slings" and "Traction." Should there be Government cranes on the wharf, a payment is effected whether they are utilised or not. This payment is $0.70 gold per ton or fraction of tons, should the crane be less than of 5 tons capacity; a special tariff is charged for use of the floating crane. The minimum charge is $50.00 paper for a lift of less than 30 tons and for the first hour, and rises to $880.00 paper for a lift of from 91 to a 100 tons.

Storage charges are collected by weight, capacity (i.e., litre), value, or per square metre of surface occupied, according to the class of merchandise and by the month. The slingage dues are equal to twice those of storage.

Traction charges are paid on merchandise transported in wagons, and are at the rate of $0.90 paper per ton entering or leaving the port; special rebates are accorded certain classes of merchandise.

North-East Coast Notes.

French Delegation at Sunderland.

ONE of the most interesting events in recent port history on the North-East Coast was the visit of a French delegation to the Wear at the end of May. It was on the special recommendation of the Director of Docks and Harbours Board of France that the party of prominent French harbour engineers and authorities paid a flying visit to Sunderland to inspect the new deep water quay and other works. The visitors made a tour of these works under the guidance of Mr. W. H. S. Tripp, engineer to the River Wear Commission, and Mr. F. Humble, general manager and clerk to the Commission. The visitors seemed particularly impressed by the magnitude of the new Quay Works, as well as by the method by which the scheme is being carried out.

The party numbered twenty and was representative of the authorities of most of the important ports of Northern France, and included the general managers and engineers of Havre, Boulogne, Calais, Quimper and Dieppe, and by the engineers of the ports of Dunkirk and Bordeaux, and by five engineers of the State Railways in France.

The delegation was led by M. Pierre Appel, Under-Secretary of State for Harbours in the French Government, and State Councillor Watier, Director of Harbours in the French Ministry of Public Works.

Subsequently the visitors were entertained to luncheon by the River Wear Commission. Alderman Frank Nicholson, who presided, said they hoped that after inspecting those works the visitors would be able to pass an opinion approving the Port of Sunderland as being one which had, at any rate, kept itself up-to-date and provided modern conveniences. The Port of Sunderland had perhaps as great, if not greater, connection with France than any other port in the kingdom. "There has probably been during the last hundred years more coal shipped from the Wear to some parts of France than from any other port in the United Kingdom," Alderman Nicholson added, "and if we have to some extent lost the custom which was of very great value to us, of the French users of coal we have never lost the hope that we will come back to the position of holding the greater part of that trade, and we have never on any side of our business shirked the responsibility of endeavouring to meet the views of our customers. As a port authority we have done everything in our power to bring our port up-to-date. We have the best methods for the shipment of coal, and we believe our collieries, situate as they are close to the sea, and with the most modern plant that can be obtained, are capable of supplying not only the requirements of France, but the requirements of other importing countries of English coal."

An Interesting Proposal.

Monsieur Watier, in reply, proposed the prosperity of the River Wear Commission and, thanking Alderman Nicholson for his cordial welcome, remarked that their visit to Sunderland was undertaken in no haphazard way, but that Sunderland was carefully selected for a visit as being a port where works of special interest to French engineers were to be seen. Sunderland, he noted, imported a large quantity of pit-props; he suggested that in order to improve their quota of coal admitted to France they should consider the question of importing French pit-props there. If such a trade could be developed, it would, he thought, enable the French Government to increase the quota of British imports of coal into France.

Mr. W. B. Nisbet, as a representative of the River Wear Commission, said he would be very glad to go into the question of importing French pit-props so as to develop the British trade in coal to France.

The River Wear Commission have decided to spend an extra £10,000 upon building up a rubble bank against the new South Pier. The Works Committee reported that the amount of stone required to complete the bank was proving to be greater than had been anticipated. Already some 70,000 tons of stone had been used on this scheme.

Tyne Dues Concession.

Mr. Francis Priestman, when submitting to the May meeting of the Tyne Improvement Commission in Newcastle the report of the Finance Committee, of which he is chairman, made reference to a concession it was recommended be granted by the Commissioners with respect to dues on small coal—nuts, peas and beans—shipped at their docks and staiths. The grading of coal by owners of collieries in order to meet the world's requirements, he said, had resulted in coal of numerous sizes being put on to the market. The Commissioners were entitled under their Acts of Parliament to 2d. per ton, plus 50 per cent., on all coal, whether large or small, shipped at their docks and staiths, but they had for many years past charged a lower rate on small than on large coal. Representations had been made that nuts were being charged at the large coal rate, and that, having regard to the classification adopted under the Coal Mines Act as between large and small coal, coal of a size not exceeding 1¼ inches was classified as small, and for the purposes of the Commissioners' dock charges should come within that category. The difference in revenue was difficult to estimate, but the Board might take it that it was not a serious item in the Commissioners' finances. The Finance Committee therefore recommended that the new classification, namely, all coal of a size of 1¼ inches or less be treated as small. The report was adopted.

Members of the Tyne Improvement Commission, including the chairman, Mr. Everett, recently inspected the new crude tar and creosote oil storage depot laid down by the Consett Iron Co. at Derwenthaugh Staiths, on the Tyne. The Commissioners were welcomed by the managing director of the Consett Iron Co., Mr. E. J. George, and the secretary, Mr. R. Alsop. The plant consists of two large tanks, with a total capacity of 7,000 tons. It is possible to load tankers at 450 tons per hour by means of electrically operated pumps.

Tyne and Blyth Coal Shipments.

The coal and coke shipments from the Tyne in the four months ended April 30th totalled 4,223,580 tons, compared with 6,448,285 tons in the corresponding period of 1913, a reduction of 2,224,705 tons, or 34.50 per cent. In the four months of 1932 the aggregate was 4,408,702, or 185,122 tons more than in the present year.

The total shipments from Blyth for the four months ended April 30th, as compared with 1932 and 1913, were: 1933, 1,794,712 tons; 1932, 1,722,421 tons; 1913, 1,518,810 tons. These show an increase of 4 per cent. on 1932 and 18 per cent. on 1913.

*Cargo Appliances at Docks**

By H. A. REED, M.Inst.C.E.

IN these days of intense competition it is very necessary that ships should remain in port for short periods only, making as many round trips as possible each year. The modern cargo steamer is of much larger size than formerly, and being costly to run and maintain, and the overhead charges being heavy, the port which can give owners the best facilities and the quickest despatch—provided other things are equal—will obtain the trade.

Quick despatch is also advantageous from the point of view of the Port Authorities themselves, since if larger quantities of cargo can be handled and quicker despatch can be given to vessels, a larger number of vessels and a greater volume of traffic will be accommodated alongside and dealt with on a given length of quay. Docks, quays and sheds are expensive to build and maintain and more intensive working of those works already constructed may save costly extensions and still give full satisfaction to shipowners.

It is necessary, therefore, to study the conditions and endeavour to use the berths already available to the best advantage by increasing crane and store accommodation, sheds, railways and roads, rather than to attempt the construction of further docks and quays, providing such cranes and accommodation can definitely increase the efficiency of the quayage length already in existence.

The principal means of increasing efficiency are mechanical, such as improved types of cranes and other unloading devices, runways, elevators, etc. Practically all cargo carrying vessels are equipped with derricks and may have cranes in addition for dealing efficiently with cargo in and out of hatches at out ports where shore cranes are not installed, at ports where the ship lies in the stream and cargo is dealt with in barges, and at ports where the method of unloading known as " burtoning " is practised. At all these places ships' gear is essential, but in most up-to-date ports where shore cranes are installed, ships' gear is only necessary for overside discharge to barge and not to quay.

A typical example of a modern cargo carrier of 4,925 tons net register, carrying about 11,500 tons deadweight, has four large hatches and three small ones which are served by sixteen 6-ton and two 3-ton steam derricks, and in addition carries two 10-ton steam derricks for heavier loads. This number of machines is ample to deal with the various hatchways, but ships' cranes and derricks are usually not so fast in their various motions as quay cranes and derricks are necessarily comparatively slow in slewing. The reach overside of ships' gear is generally small and, while usually quite sufficient for loading to barges or landing cargo on the quayside, it cannot as a rule load to wagons, especially those on backroads, nor can it reach the various floors of the quay sheds. If all cargo had to be dealt with on the quay, the ships' gear on one side only could come into play.

To load or unload a vessel such as this by means of quay cranes, two cranes should be brought to bear on each large hatch and one on each smaller hatch. The cranes would probably be of the 30-cwt. or 2-ton electric type, with fast hoisting and slewing motions; they would be able to command the full width of the hatchways and to deposit the cargo in lorries, railway wagons or on all the floors of a range of transit sheds situated at the rear of the open quay.

Ships' gear is essential for the coasting trade, as the vessels call at the smaller ports, at many of which no facilities for unloading are provided on the quay, or those provided are inadequate. An up-to-date steamer used in this class of trade with a net registered tonnage of 478 tons and carrying 1,624 tons deadweight on a draught of about 16-ft. 9-in. has three hatchways and is equipped with three 4-ton and four 5-ton steam derricks, and has also one 6-ton and one 10-ton steam derrick for heavier lifts.

Port Lay-out and Cargo Handling.

The lay-out of a port is dependent on the class of trade it is expected to acommodate, and the majority of ports have to handle general cargo at most of the berths. Some ports are laid out wholly for certain classes of cargo such as coal; others have berths or dock areas laid out and reserved for bulk cargoes such as coal, oil, grain or ore. These materials require special appliances for dealing with them efficiently and arrangements designed particularly for storage and despatch.

Cargo can be divided roughly into two categories: general cargo and bulk cargo. It is proposed to deal first with general cargo and its appliances, and then to illustrate some of the methods of handling goods in bulk.

General cargo is transported in units and much of it is packed in bags, crates, boxes, barrels, tins and other containers. If the cargo in a ship is to a large extent of like character and packed in cases of similar size (such as tea chests) special appliances can be arranged for handling the goods satisfactorily to give quick despatch, but if the cargo be of a miscellaneous character it is difficult or even impossible to adopt any special plant, and cranes and trucking have to be relied upon, with possibly some runways in the transit sheds.

Packages commonly handled at Manchester Docks vary in weight from 14 cwts. to ½ cwt., and are of all sizes and shapes. It is usual to unload the smaller packages in slings; rope nets, trays or skips as may be most convenient in order to minimise the number of lifts by the cranes.

The general lay-out of a dock estate is an important factor in the cheap and rapid discharge of cargo, and the best use of the quayside facilities, cranes, sheds and so forth is dependent on the rapid transit of goods by road and railway to and from the quays and by water from the dock. The various proportions of the inward and outward cargo which are transported by water, rail or road must be ascertained, and also the proportion of the cargo which is likely to go to store.

Manchester Docks.—At Manchester, the estate around No. 9 Dock is 2,700-ft. long and has quays on both sides. On one side transit sheds run continuously for nearly the whole length of the quay; on the opposite side, only about two-fifths of the length is provided with sheds, the rest being open quay.

The sheds are of four and five stories and are designed for the transit of goods only, a penalty rent being charged after goods have remained three days in store. The quays have two railway lines in addition to the crane road which is next to the quayside and two lines of railway are also provided at the back of the sheds. A cross-over road connects the railways at the front and those at the back of the transit sheds to permit of the shunting and changing of wagons on the quay roads in an expeditious manner without disturbing the work on the whole length of quay. For the handling of railway traffic, sidings are provided near the quays, storage sidings elsewhere and exchange sidings for handing traffic over and receiving it from the various railway companies. The quays are paved and roads are provided at the back of the sheds and also connecting roads with the public thoroughfares for the accommodation of road traffic.

Some Typical Lay-outs.

Reference will now be made to some typical examples of lay-out in a few of the most modern ports in this country.

The Port of London.—A high percentage of the general cargo in the Port of London (said to be 80 or 90 per cent.) is carried by barge, and is delivered to the barge either direct or after having been sorted on the quay. To deal satisfactorily with this high percentage of barge traffic, on one side of the dock the vessels are moored alongside island piers or jetties which allow room for two tiers of barges to lie between the pier and the quay. Electric level luffing portal cranes with a capacity of 2 tons at 65-ft. and 3 tons at 60-ft. radius stand on these jetties and command the ships' hatchways, the quay, the quay railway and the barges between. The transit sheds are 120-ft. wide with a single storey only, as the majority of the cargo is dealt with direct by barge. The sheds are served by railways and roads at the back and front.

On the opposite side of the dock the arrangement is somewhat different. Here the portal cranes, similar in capacity to those on the other side, stand on the quay front and command ships' holds, quay railways and shed platforms. The sheds are of the two-floor type, as they have to deal with a large proportion of the cargo to and from the vessel which is immediately alongside the quay.

The transit sheds are 115-ft. wide with a headroom of about 15-ft. on each floor, the upper floor being served by 1-ton underslung overhead cranes which run on tracks from front to back of the sheds. These cranes command the railways and can handle cargo from the floor below through hatchways in the upper floor.

Liverpool.—The Gladstone dock system at Liverpool is a very recent example of dock quay design. The pier between the Gladstone branch docks Nos. 1 and 2 is about 310-ft. wide and carries continuous three-storeyed reinforced concrete sheds on each side with two double lines of railway and a cart-road between the sheds. There is also a single line of railway between the sheds and the quay faces and one line inside each

* Abstract of paper read before the Manchester-Liverpool and District Section of the Institute of Transport on January 27th, 1933, and published by kind permission of the Institute.

Cargo Appliances at Docks—continued

shed. The cranes on both the quay and the rear sides of the transit sheds travel on the flat roofs, the quay cranes being of 30-cwt. capacity with an outreach of 60-ft. beyond the quay face, and the rear cranes of 1 ton capacity.

Manchester.—The most recent type of transit shed erected in Manchester has five floors all under cover, the face of the building being set back 38-ft. 10-in. from the face of the quay wall. The sheds are 450-ft. long by 110-ft. wide, the upper floors being designed to carry 30 cwt. per sq. yd.

The quay is equipped with 2-ton electric cranes, seven to each shed, commanding ships' hatchways, quay, railways and all the floors of the sheds by means of continuous doors and platforms on each floor. At the back semi-portal electric cranes of 1 and 2 tons capacity, four and two respectively to each shed, command the railways, cartways and all the floors of the sheds by means of doors and platforms in alternate bays on each floor.

After being landed by the cranes on the platforms at the front or back of the sheds, the cargo is usually moved into the sheds by hand trucking, weighed, sorted to marks and stacked. The upper floors have been designed with rather small headroom, as it is expensive to stack very high by hand, and, moreover, the various shipping marks are always a handicap to close stacking.

Southampton.—The new quay at Southampton, which is mainly for passenger traffic, but in addition has to deal with a fair amount of cargo, was only used for the first time in December last. This quay, which is founded on huge monoliths and has 45-ft. of water alongside at low water, is served by portal cranes of 5-ton capacity with an outreach of 77-ft. 6-in. beyond the quay face. The sheds are of single-storeyed type and slope up from back to front so that passengers can alight from the train to a platform and walk through the sheds to the ship.

For coasting work, the transit sheds need not be so extensive, and a single-storeyed shed about 80-ft. wide is ample with a quay for two railways, on one of which 30-cwt. cranes should be installed. Road access along the quay and inside the shed is essential.

Burtoning.

Although not used in this country or on the Continent, the method of handling cargo known as burtoning is extensively used in North American ports. At ports where burtoning is practised the sheds are built close up to the face of the quay. For example, the piers at New York project into the harbour at right angles to the shore, the sheds cover practically the full width and length of the piers and railways generally are arranged on the ground floor of the shed down to the centre of the pier.

The operation of burtoning is performed by the ships' derrick and winch working in conjunction with a winch ashore. The fall from the ships' gear is hooked to the package to be lifted from the hold while a line from the winch ashore is led over a pulley block fixed above the face of the shed and is also attached to the load. When the package has been lifted clear above the hatchway the derrick pole moves towards the quay and the line from the winch ashore gradually takes charge of the package until it is landed on the shed floor. The shore winch and tackle are movable and can be arranged in any convenient position to work in conjunction with the ships' gear.

It is understood that the gear can work quite as fast as, if not faster than, a crane, but the load carried is usually less in weight, the action is necessarily only in a straight line, the load can be taken up or put down on the shed floor in only one position and cannot be loaded to wagon or cart. The winches are easy to work and not costly to maintain, but they require two men to work them, one ashore and one afloat, whereas a crane has only one driver and has a much more extended radius of action. Where piers and sheds have been so built that space is restricted, the burtoning method has its advantages, but at a port where space is available and roads and railways outside the sheds the quay crane has very distinct advantages.

Mechanical Cargo Handling.

The question of handling general cargo by mechanical methods is a very thorny one. Where cargo is of so many classes, weights and sizes, it is impossible to adapt any form of runway or conveyor to the movement of the goods and trucking by hand is indispensable, but where large consignments consisting of packages, of similar shape, size and weight are being received with fair regularity, it is possible to adapt gravity runways or power conveyors to do the work of transportation in a satisfactory manner.

There are many types of conveyors, portable and otherwise, some worked by power and others relying on gravity only. Trucks and trailers worked by power, some by electricity with accumulators and others by Diesel electric engines, are coming more and more into use. A modern type, the " R and R," lifts loads up to 1 ton in weight by means of its crane, and has also a table for carrying its load about.

Quay cranes play such an important part in modern dock equipment that a paper on this subject would not be complete without a description of the types more usually employed. The motive powers are steam, hydraulic, electric and oil. Steam is now generally used only for cranes in isolated positions, for those of large size or for a special purpose. Hydraulic cranes, which were first used about 60 years ago, have done excellent work, and many are still in use. Most modern cranes are driven electrically, and this type is being installed practically everywhere where electricity is available. A few cranes have been fitted with oil engines and some with Diesel Electric engines, but these are not likely to be adopted generally.

Of the many types of crane in use, the principal ones can be summarised as follows:—

1.—Ordinary type running on 4-ft. 8½-in. or other gauge railway with or without wider gauge or screw jacks for use under load.

2.—Portal type, spanning one or more railway lines on quay.

3.—Semi-portal type with one leg on quayside and the other on shed roof or gantry and spanning one or more railway lines on quay.

Other varieties, not in general use, are the kingpost type on the face of a building near the quayside and the type which runs on the shed roof, either flat or sloping.

When considering the lay-out of a port the question of the capacity of the cranes to be erected is a difficult one to settle and depends largely on the nature of the general cargo to be handled. It is not advisable to instal cranes of a greater outreach or capacity than is absolutely necessary for normal working having regard to the extra capital cost, maintenance and running expense involved by a crane of greater weight and capacity than is necessary. Added to this, it must be remembered that a crane of smaller capacity can be designed to work more expeditiously.

The capacity of quay cranes is usually 30 cwt. or 2 tons for normal working, but somewhat greater capacities have been adopted at some ports, especially those abroad.

A few examples are given in the following list:—

Port of London Authority, King George V. Dock ...	2 tons at 65 feet radius
	3 ,, 60 ,, ,,
Mersey Docks and Harbour Board, Gladstone Dock	3 ,, 60 ,, ,,
	1½ ,, 71 ,, ,,
Southampton, New Quay	5 ,, 90 ,, ,,
Beira, East Africa	3 ,, 55 ,, ,,
	6 ,, 42 ,, ,,
	four per berth — one capable of lifting 6 tons at lesser radius
Kilindini, Kenya	3 tons at 55 feet radius four per berth
	5 tons at 55 feet radius one per berth
Manchester, No. 9 dock	2 tons at 37 feet radius
	1½ ,, 34 ,, ,,
Ellesmere Port, New Quay	2½ ,, 45 ,, ,,
	10 ,, 45 ,, ,,

The speeds of the various motions of cranes are important and are designed to be as fast as possible consistent with safety. A list of some typical cranes is given in Appendix A with the speeds of lifting, luffing, slewing and travelling, together with some of the main dimensions.

The number of cranes which should be placed on a quay varies from port to port, but a general arrangement is one crane per 100-ft. or less, or four or five cranes per berth. If plenty of cranes are available on a long quay they can be concentrated on a ship's hatchways as may be necessary to give quick despatch.

An interesting development which has been adopted at Manchester, but is not in general use elsewhere, is the Holmes distant control gear, by means of which the crane driver can control all the motions of the crane through switch gear hanging from his shoulders and connected to the crane by cable. The driver can take up a convenient position near the hatchway and see the load himself all the time, thus dispensing with a signalman and at the same time doing the work more expeditiously and with greater safety.

Bulk Cargo Handling Appliances.

Having outlined some of the methods which are in use in handling general cargo, I now propose to describe shortly a few of the many appliances for dealing with bulk cargo. Bulk cargo is carried loose and unpacked and can be handled in the mass, the principal items being coal, oil, grain, ore and timber, which are usually handled by mechanical means. Other items carried loose, such as stone, sand, sulphur, pitch and china clay, are usually handled by crane or grab. Meat, which is carried in large quantities in ships with refrigerated chambers is usually unloaded by specially designed runways and bands.

Coal.—The mechanical handling of coal at ports was very fully described by Mr. N. G. Gedye in the last Vernon Harcourt Lecture delivered before the Institution of Civil Engineers and

Cargo Appliances at Docks—continued

as this paper contains a mass of useful information and statistics which can be recommended to anyone wishing to delve further into this subject, it is not proposed to deal with this important branch of port work at any length in this paper.

In spite of the increasing use of oil and water power, the volume of coal and coke shipped in this country is still very great. In 1913, 117 million tons were shipped; in 1929, 97 million tons—both foreign and coastwise. It is also interesting to note that of the 20 million tons of coal and coke taken to London over 11 million tons are transported by sea.

The types of loading appliances for coal are innumerable, many older than the railways. For instance, on the River Tyne, where the banks are high, coaling staithes have been in use for many years and are still cheap and efficient compared with other more modern methods. The coal is brought in on high level roads and is dropped by gravity from drop bottom wagons into bins and thence by shoots to the steamers below. This same method has been continued in some of the more modern lay-outs on the Tyne.

The question of the size of wagon to be used for coal handling is a debatable one; 20-ton or even larger wagons are cheaper to run, handle, and tip than those of 10 or 15 tons, and they would be adopted rapidly were it not that the increased size makes it impossible to handle them at many of the existing tips and also that the cost which would be entailed in altering and improving colliery sidings and curves, and increasing headroom and clearance to structures as washers, is prohibitive.

Twenty-ton wagons are coming more and more into use in South Wales, a steel-end door type having been introduced by the Great Western Railway. The London and North-Eastern Railway is also using larger wagons, while some colliery companies use their own large wagons, such as the 20-ton drop bottom type which are brought and tipped in train loads to bins from which the coal is carried to the colliery loading belts, the outer belt being on a radial arm to give mobility.

The type of hoist most frequently in use is the one fixed at the quayside and approached by low and high level roads for full and empty wagons. The wagons usually hold 12 to 15 tons with end doors, and are run on to a table, lifted by hydraulic power and tipped forward, the coal falling down a shoot to the ships' holds.

Two appliances for facilitating the work of an electrically operated hoist are of interest. The first is an electrically driven belt incorporated in the shoot to allow of the shoot being lifted to, and even above, a horizontal position when feeding coal to the ship; this is particularly useful when bunkering, small bunker hatches often being in awkward positions and at too high a level for gravity feed. The shoot can be used either with or without the belt being in motion.

The second appliance is the " Norfolk " spade, which has been designed to move washed slack which has stuck in the wagon. It is difficult and costly to move this coal by hand, and valuable time is lost in the process. The shovel is worked hydraulically and is arranged on a frame over the wagon into which it dips and presses out the coal gradually in slices.

Belt conveyor installations have been introduced at various ports, notably at Hull Joint Dock, where they have been in use for many years. At first flat steel plates or trays were used, but latterly rubber belts have successfully been adopted.

Belt conveyors are used for loading coal at Hull, Curtis Bay, Baltimore and Ellesmere Port. Each unit of the Hull plant loads up about 800 tons per hour. The Curtis Bay plant is fed at its shore end by two conveyors which receive the coal from 100-ton wagons and tip it to bins, from which four belts transport the coal along the pier to four loading towers, where the coal is dropped on to cross belts and passed to the hold through a mechanical trimmer. The whole plant can load at a maximum rate of 8,000 tons per hour and two loading towers have actually loaded 9,000 tons in 9½ hours. The Ellesmere Port plant is in duplicate in order to load to two hatches of one vessel at the same time and the loading belt frames are radially fixed in order that the shoot may reach all the hatches. The maximum capacity of each unit is 400 tons per hour.

The unloading of coal from vessels is equally important, but is not always carried out so expeditiously; in many cases grab cranes are used for unloading, the coal being dumped on the wharf or loaded to coal wagons direct. Where large quantities of coal have to be unshipped the wharf or quay is designed specially for coal discharge, the grab cranes acting in conjunction with transporters, bins and belts; at some plants where slack is used, pneumatic plant has successfully been employed.

A very good example of modern practice is to be found at the new Battersea power station of the London Power Company. The coal handling plant is designed to feed the power station with sea-borne coal and also to load part of the coal into railway trucks for transfer to another generating station belonging to the London Power Company. The plant can also deal with rail-borne coal if necessary.

The coal is to be brought by sea in six special steamers, one of which carries 2,000 tons and is designed to navigate under the Thames bridges. Coal can be unloaded simultaneously from two ships or alternatively from barges at an island jetty by means of two travelling level luffing cranes, electrically driven, furnished with 5-ton grabs and designed to unload 240 tons per crane per hour.

The cranes feed into hoppers and thence the coal falls on to two 30-in. belt conveyors extending the whole length of the jetty. These discharge on to two inclined belt conveyors which transport the coal ashore to a tower where it is weighed in a pair of 3-ton automatic weighers. After being weighed the coal drops into a hopper and from thence it can be transported either (a) to a 40-in. elevated horizontal belt conveyor with a capacity of 480 tons per hour for delivery to coal store, (b) to one or both of two inclined belt conveyors towards the boiler house, or (c) through an adjustable feeding shoot into railway wagons. The arrangements for storing and handling the coal to and in the boiler house are very complete.

Oil.—The transport of oil in its various forms has increased enormously in recent years, due to the rapid development of light and heavy oil engines and the general use of petrol, petroleum, fuel oil and the various petroleum products.

Dock authorities have had to provide accommodation for the discharge and loading of these products. In many cases open jetties have been provided in rivers or entrances and in others, closed docks. In the case of the highly inflammable oils it is essential that careful precautions should be taken both to isolate the vessels during discharging and the tanks in which the oil is stored.

The Manchester Ship Canal Company has developed the oil industry very successfully. The petroleum berths are numerous and placed in positions convenient for the trade, but the handling of petrol has been confined to special oil docks situate near to Ellesmere Port and 4½ miles from Eastham. Here the vessels are unloaded in an isolated dock closed by a caisson; a second dock has been built and is nearly ready for use. Special boiler plant is provided for supplying steam to the ships' pumps and the oil is pumped ashore and passes through a subway under the Ship Canal to the works and storage tanks of the various oil companies.

The present dock is 600-ft. long by 100-ft. wide, with an entrance 80-ft. wide closed with a reinforced concrete caisson moving in granite grooves on either side of the dock entrance. The dock now approaching completion is 650-ft. long by 180-ft. wide and has an entrance 180-ft. wide. In this case the caisson or boom for closing the entrance is being made of baulks of timber and is 16-ft. wide by 7-ft. deep. The wood is pitch pine with the exception of the outer baulks, which are of brushbox, a close grained timber from Australia which does not burn so freely as pine. It is expected that if this boom be attacked by fire it would be charred on the outside but would resist successfully and prevent the escape of burning petrol to the canal while a fire in the dock was burning out.

This method of sealing the second dock entrance has been adopted because the resistance of timber to fire is very great and it was thought that a concrete structure of the length and dimension required to close the entrance might break up, disintegrate and sink under a fierce fire. A timber structure would never sink, the charred portion would be lighter than the original timber, and after the outer baulks had charred the interior ones should remain intact even under extreme fire conditions.

The present dock has a main berth for large ships and a smaller one on the offside of the dock for coasters loading petrol outwards; the new dock is provided with main berths on both sides. The oil pipes are 10-in. diameter and the steam pipes are 6-in. diameter; steam is supplied at 120 lbs. per sq. in. from three oil-fired water tube boilers capable of evaporating 47,000 lbs. of water per hour.

Oil is discharged through the pipelines in the ships' pumps at the rate of 200 tons per hour to each pipeline.

In the scheme now approaching completion a turning basin is provided for vessels to turn at the entrance to the two docks.

Grain.—The unloading of grain by mechanical means has been standardised to such an extent at all large ports that it is hardly necessary to refer to it in any great detail.

At ports where discharge is overside to barges, as at Rotterdam, floating elevators lift, weigh and discharge the grain to barges lying alongside either in bulk or after bagging in the elevator.

The method by which a ship has been loaded, even when she has a full cargo of grain, presents a good deal of difficulty at the port of discharge, as the grain is never in one parcel, but is in various parcels of different quality and different ownership, separated by timber, tarpaulin, etc. These cause difficulties and delay in unloading, and care is required in dividing the parcels and clearing each up separately. Pneumatic plant is particularly useful for getting into the corners, but a bucket

Cargo Appliances at Docks—continued

elevator is more expeditious and cheaper when the grain is in considerable bulk.

A combined bucket and pneumatic plant is installed at Manchester for delivery direct to a 40,000-ton elevator, the bucket having a maximum capacity of 350 tons and the pneumatic pipes 120 tons per hour

In many ports, subways below the quay wall or overhead galleries on the quay have been provided to carry the grain to an elevator which can be placed in a convenient position away from the quayside. Grain is unloaded from the ship to the quay bands by movable bucket elevators and bands, which can be rigged up on the ship and across the deck to the quay, or by bucket or pneumatic elevators running on the quay or floating alongside.

Many flour mills have been erected at the ports, thus saving considerably on the cost of transport of the bulk grain. The mills can be connected directly with the elevator by belt subway or gallery or in a position on the waterway, which enables them to take delivery from a barge which has been loaded alongside the ship in the port. In some cases the mills can take grain direct from the ship to their own silos, but this is only possible when the mill is directly alongside or near a quay and has provided sufficient storage accommodation of its own for the various grades of grain required for milling.

Timber.—Timber is a difficult cargo to deal with successfully and, the trade being a seasonal one, quick despatch from the steamer is essential, and storage accommodation is required as the timber cannot be removed from the dock estate immediately.

A very large proportion of the timber now imported comes in small sizes, sawn into boards, planks or battens. It is usually lifted out of the ships by cranes in slings and either placed on flat trucks and taken to the storage grounds or dumped quickly on the quay and carted or trucked away at leisure. In some cases gravity runways can be adopted, and in others Temperley transporters can be used.

Ore.—The many plants which have been designed for the handling of ore both in and out of ships require a lengthy description if they are to be dealt with effectively, and I shall refer only to a specific example of recent practice in unloading methods adopted on the Manchester Ship Canal. The plant referred to is installed on a wharf recently constructed on the canal at Irlam for the Lancashire Steel Corporation in order to serve its steel works with ore direct from ship to the works. The wharf is 650-ft. long with a 600-ft. berth and has 30-ft. depth of water alongside.

Ore is unloaded by two 7¼ cub. yds. capacity grab buckets carried on two travelling gantries each with a hinged arm to plumb the ship's hold. The ore is dropped into two weighing hoppers, also carried on separate travelling gantries, and falls from the hoppers into an ore trough which is formed along the whole length of the wharf. A large travelling gantry at the back of the wharf running on rails 200-ft. apart spans the ore dump and has arms, one of which extends over the ore trough at the front and the other over a railway carrying a transfer car at the back. The grab bucket on this machine is of 14 cub. yds. capacity and can carry ore between the front ore trough, the ore dump and the transfer car. This car runs to a hopper over a 48-in. wide belt, which carries the ore to other belts which serve storage bins at the blast furnaces. All the plant is electrically operated and the two grab buckets are estimated to unload a ship at the rate of 330 tons per hour.

Heavy Lifts.

Heavy lifts have to be dealt with at most ports and are most efficiently raised by floating cranes which can take up the loads at the quays, carry them on deck and load them aboard the ships. The 200-ton floating crane at Liverpool and the 60-ton floating crane at Manchester are good examples of this type.

Some ships are specially equipped for dealing with heavy lifts and large machinery, such as complete locomotives, tenders, coaches, etc. One such vessel is of 2,400 tons gross tonnage, 294-ft. long, 45-ft. beam and about 19-ft. draught, with a very large hatchway, and a 100-ton derrick with two winches, luffing and jibbing tackle.

Cargo handling is a very wide subject, each branch of which would require a separate paper to deal with it at all effectively. Little more than an outline has been given, but these remarks may have served to indicate, in a general way, what is being done at modern ports to handle cargo efficiently, give quick despatch and at the same time cheapen costs.

The paper was illustrated by means of upwards of sixty lantern slides.

APPENDIX A.

QUAY CRANES.

Description	Load tons	Outreach beyond face of quay.	Maximum radius	Lifts above quay	Lifts below quay	Speeds lifting feet per minute	Speeds luffing	Speeds slewing	Speeds travelling	Remarks
Beira (portal)	3	40ft. 0in.	55ft. 0in.	55ft. 0in.	50ft. 0in.	200	120	1½ rev.	hand	3 3-ton and
,, ...	3	40ft. 0in.	55ft. 0in.	55ft. 0in.	50ft. 0in.	200	120	1½ rev.	hand	1 6-ton to
	6	40ft. 0in.	42ft. 0in.	55ft. 0in.	50ft. 0in.	100	120	1½ rev.	hand	each berth
Southampton (portal)	5	77ft. 6in.	90ft. 0in.	85ft. 0in.	30ft. 0in.	100	120	1 rev.	50	
Kilindini, Kenya (portal)	3	41ft. 6in.	55ft. 0in.	60ft. 0in.	50ft. 0in.	200	200	1½ rev.	50	4 3-ton and
	1½					300				1 6-ton
	5	41ft. 6in.	55ft. 0in.	60ft. 0in.	50ft. 0in.	120	200	1½ rev.	40	per berth.
	3					180				
Manchester.										
No. 9 Dock (4ft. 8½in. gauge) ...	2	28ft. 10in.	37ft. 0in.	63ft. 9in.	30ft. 3in.	200	—	300	hand	about 70ft.
	1½	25ft. 10in.	34ft. 0in.	50ft. 0in.	28ft. 0in.	200	—	300	hand	apart.
Docks 6 and 7 and South of 8 (hydraulic)	1½	24ft. 10in.	33ft. 0in.	46ft. 0in.	20ft. 0in.	150	—	300	hand	
Irwell Park Wharf (portal) ...	5	29ft. 6in.	46ft. 6in.	40ft. 0in.	30ft. 0in.	100	90	300	100	ore grabs.
Ellesmere Port.										
New Quay (portal)	2½	33ft. 3in.	45ft. 0in.	60ft. 0in.	30ft. 0in.	200	150	350	100	
	10	33ft. 3in.	45ft. 0in.	60ft. 0in.	30ft. 0in.	50	50	300	50	fitted for grab.

The Port of London Authority

London's Shipping.

During the week ended June 2nd, 949 vessels, representing 1,140,004 net register tons, exclusive of those in ballast, used the Port of London; 507 vessels (927,673 net registered tons) were to and from Empire and foreign ports, and 442 vessels (212,331 net registered tons) were engaged in coastwise traffic.

* * * *

During the week ended June 9th, 1,021 vessels, representing 818,841 net registered tons, exclusive of those in ballast, used the Port of London; 413 vessels (652,190 net registered tons) were to and from Empire and foreign ports, and 608 vessels (166,651 net registered tons) were engaged in coastwise traffic.

* * * *

During the week ended June 16th, 1,041 vessels, representing 1,052,299 net registered tons, exclusive of those in ballast, used the Port of London; 525 vessels (893,466 net registered tons) were to and from Empire and foreign ports and 516 vessels (158,833 net registered tons) were engaged in coastwise traffic.

* * * *

During the week ended June 23rd, 870 vessels, representing 894,547 net registered tons, exclusive of those in ballast, used the Port of London; 484 vessels (725,386 net registered tons) were to and from Empire and foreign ports, and 386 vessels (169,161 net registered tons) were engaged in coastwise traffic.

Tilbury Passenger Landing Stage.

Twenty-eight vessels, totalling 275,209 gross registered tons, used the Tilbury passenger landing stage during the month of May, 1933. Altogether 4,166 passengers were embarked or disembarked at the stage, in addition to baggage and mails.

The Port of New York

Latest Data issued by the Bureau of Commerce

Vessel Movement in Foreign Trade.

THE number of vessels entering and clearing in foreign trade at the Port of New York in the month of April, 1933, were lower than in any month this year, and were 15 and 17 per cent. respectively lower than in April of last year. The number of vessels in ballast, however, 29 in the entrances and 73 in the clearances, represented a smaller percentage than in any month this year.

	April		Net Change	
	1933	1932	Amount	Per Cent.
Entrances, No. of Vessels ...	378	447	—69	—15·4
Clearances, No. of Vessels ...	388	468	—80	—17·1
Entrances, Net. Reg. Tonnage	1,958,481	2,258,152	—299,671	—13·3
Clearances, Net. Reg. Tonnage	1,969,520	2,303,683	—334,163	—14·5

For the first four months of 1933, January to April, the number of entrances were 1,555, as compared with 1,804 during the same period last year, a decline of 14 per cent., and 1,637 clearances as against 1,886 last year, a drop of 13 per cent.

	January-April		Net Change	
	1933	1932	Amount	Per Cent.
Entrances, No. of Vessels	1,555	1,804	—249	—13·8
Clearances, No. of Vessels ...	1,637	1,886	—249	—13 2
Entrances, Net Reg. Tonnage	8,280,458	9,339,012	—1,058,554	—11·3
Clearances, Net Reg. Tonnage	8,537,050	9,490,844	—953,794	—10·0

Value of Foreign Trade at the Port of New York.

The value of foreign trade at the Port of New York in March, 1933, was $83,647,000, as compared with $115,405,000 in March of last year, a falling off of 27 per cent. In comparison with the March, 1931, figure of $187,762,000, the decline is 55 per cent.

	March		Net Change	
	1933	1932	Amount	Per Cent.
	$	$	$	
Exports	37,379,000	48,268,000	—10,889,000	—22·6
Imports	46,268,000	67,137,000	—20,869,000	—31·2
Exports and Imports	83,647,000	115,405,000	—31,758,000	—27·5

The foreign trade of the port for the first quarter, January to March, 1933, was valued at $250,220,000, which was $90,046,000 less than that of the corresponding period a year ago, a decline of 26 per cent. Exports declined 20 per cent., while imports dropped 31 per cent.

	January-March		Net Change	
	1933	1932	Amount	Per Cent.
	$	$	$	
Exports	111,727,000	139,697,000	—27,970,000	—20·0
Imports	138,493,000	200,569,000	—62,076,000	—31·0
Exports and Imports	250,220,000	340,266,000	—90,046,000	—26·5

The exports at the Port of New York consist largely of manufactured articles. Export values of a selected list of such, comprising 28 per cent. of the total exports, are shown below for the first quarters of 1933 and 1932. The net decline in this group is 18 per cent., with copper and manufactures the greatest, 44 per cent., and automobiles and parts showing 2 per cent., the least of all.

Value of Exports of Selected Manufactures at the Port of New York.

	January-March		Net Change	
	1933	1932	Amount	Per Cent.
	$	$	$	
Iron and steel semi-manufactures	716,029	880,303	—164,274	—18·7
Steel-mill products ...	1,772,004	2,354,783	—582,779	—24·8
Iron and steel advanced manufactures	2,330,741	2,847,531	—516,790	—18·1
Copper and manufactures	2,590,592	4,601,839	—2,011,247	—43·7
Industrial machinery ...	8,169,520	11,066,000	—2,896,480	—26·1
Agricultural machinery and implements	1,309,766	1,736,674	—426,908	—24·6
Automobiles and parts ...	14,131,713	14,378,870	—247,157	—1·7
Total of selected manufactures ...	31,020,365	37,866,000	—6,845,635	—18·1

Iron and steel semi-manufactures include pig iron, iron and steel scrap, bars, plates and sheets. Steel-mill products include structural iron and steel, railway-track material, tubular products, wire, castings and forgings. Iron and steel advanced manufactures include cutlery, metal furniture, stoves and furnaces, tools and hardware. The other designations are self-explanatory.

An analysis discloses that the declines in the exports of the above articles are due, in part at least, to restrictions placed upon imports of American goods into the United Kingdom by the British Import Tariff Act, which took effect on March 1st, 1932. During the two months prior to the enactment of the tariff act, 11 per cent. of the exports of these articles from the Port of New York went to the United Kingdom, while in the same period in 1933 they were only 5 per cent. Considering the item of copper and manufactures, which registers the greatest decline in the first quarter of 1933, we find that whereas in January-February of 1932 exports to United Kingdom from the Port of New York amounted to 25 per cent. of the total, the exports in those two months of 1933 were only 6 per cent. The exports of copper and manufactures to United Kingdom dropped from $1,130,470 to $157,092, or 86 per cent. Exports of industrial machinery to the United Kingdom in the first two months of 1933 declined 64 per cent., from $2,317,220 in 1932 to $820,529 this year.

Comparative Statement of the Value of Exports of Certain Articles from the Port of New York to United Kingdom.

	January-February		Net Change	
	1933	1932	Amount	Per Cent.
	$	$	$	
Iron and steel semi-manufactures	8,034	40,722	—32,688	—80·3
Steel-mill products ...	28,261	85,496	—57,235	—66·9
Iron and steel advanced manufactures	89,826	256,855	—167,029	—65·0
Copper and manufactures	157,092	1,130,470	—973,378	—86·0
Industrial machinery ...	820,529	2,317,220	—1,496,691	—64·5
Agricultural machinery and implements	71,269	141,949	—70,680	—49·8
Automobiles and parts ...	330,062	274,934	+55,128	+20·0
Total of selected manufactures ...	1,505,073	4,247,646	—2,742,573	—64·5

The gain of 20 per cent. in exports of automobiles and parts to United Kingdom explains, in a measure, the slight decline in the total exports of these articles, and is an indication of the demand for American made cars abroad.

Commerce at Port Newark.

The volume of water-borne receipts at Port Newark during the month of April, 1933, declined 25 per cent. as compared with that month last year. This is the only break in the upward trend, which has characterised this activity at Port Newark since the first of the year. This falling off was caused by a drop of 16,015 tons in receipts of cargo other than lumber, as compared with last year, equal to 44 per cent. The 20,683 tons of general cargo included 9,012 tons of perishable foods, mainly potatoes and bananas. Receipts of lumber by vessel showed a gain of 2,000,000 board feet, or 20 per cent. Lumber shipped inland out of Port Newark during the month amounted to 11,392,000 board feet, of which 5,305,000 feet moved by railroad and 6,087,000 feet moved by truck.

Thirty-seven steamers arrived during the month, as compared with 41 a year ago, and 62 lighters, barges, etc., moved in and out, as against 60 in April, 1932.

Water-borne Receipts at Port Newark.

	April		Net Change	
	1933	1932	Amount	Per Cent.
All Commodities (tons)...	38,721	51,727	—13,006	—25·1
Lumber (board feet) ...	12,025,220	10,019,430	+2,005,790	+20·0
Other than lumber (tons)	20,683	36,698	—16,015	—43·6

For the first four months of the year, January to April, the water-borne receipts at Port Newark have amounted to 185,089 tons, which is an increase of 33,868 tons, or 22 per cent., over that of the corresponding period of 1932. Receipts of lumber increased 3 per cent. during the period, and cargo other than lumber increased 37 per cent. The number of steamer arrivals have also shown a substantial increase over the first four months of last year, numbering 151 in that period in 1933 as against 105 in 1932, a gain of 44 per cent.

Water-borne Receipts at Port Newark.

	January-April		Net Change	
	1933	1932	Amount	Per Cent.
All Commodities (tons)...	185,089	151,221	+33,868	+22·4
Lumber (board feet) ...	44,970,375	43,764,683	+1,205,692	+2·8
Other than lumber (tons)	117,633	85,574	+32,059	+37·4

Steamship Sailings.

Direct sailings to foreign ports in April are still approximately 15 per cent. less than a year ago. This is in contrast to the domestic intercoastal and coastal services, the first of which is holding its own and the latter showing a decided increase.

The Port of New York—continued

The principal foreign routes that show curtailed sailings are those serving the United Kingdom, Rotterdam-Antwerp and French Atlantic ports.

There has also been a big reduction in sailings to points in New England *via* Long Island Sound. This is partly due to the substitution of numerous overnight motor truck services between New York and that territory.

The total of all sailings from the Port of New York during April were almost 200 less than that month last year. Saturday, the 22nd, was the peak day of the month, with a total of 68 sailings in all services. Of these, 33 were to foreign ports, including 1 to the United Kingdom, 3 to the Baltic, 1 each to France, Belgium, South Africa and South America west coast, 2 to Italy, 8 to Caribbean-Mexican ports, 2 to River Plate, 2 to Canadian Atlantic ports and 4 tankers. The other 35 sailings on that day were to domestic points and included 2 to the Pacific Coast, 8 to South Atlantic and Gulf ports and 8 tankers.

Steamship Passenger Traffic.

For the first time in four years the steamship lines in domestic service report an increase in the number of passengers carried in and out of the Port of New York.

While these lines carried 102,616 passengers during the first three months of this year, 97,664 passengers were carried in the same period last year.

This traffic covers through passengers *via* those lines in Intercoastal, Coastal and Hudson River Service, and does not include one-day excursionists to nearby points on Long Island Sound and the Hudson River.

Receipt, Storage and Export of Grain at the Port of New York.

The receipts of grain at the Port of New York in April, 1933, were 480,000 bushels as compared with 2,331,100 bushels during the same month last year. This large decrease of 1,851,100 bushels, or 79 per cent., in the receipts of one month is the effect of the British import regulations which have brought exports of grain at the Port of New York to nearly a standstill. The receipts in April by method of carriage, compared with the same month last year, were as follows:—

Receipts of Grain (bushels)

	April 1933	April 1932	Net Change Amount	Net Change Per Cent.
Rail	93,000	2,235,100	—2,142,100	—95·8
River	275,000	———	+ 275,000	———
Canal	112,000	96,000	+ 16,000	+16·7
Total	480,000	2,331,100	—1,851,100	—79·4

Grain designated or having arrived *via* " river " was shipped to the port from storage elevators at Albany, N.Y. The volume of grain receipts at the Port of New York for the first four months of the year, January to April, was 80 per cent. less than in the same period last year.

Receipts of Grain (bushels)

	January-April 1933	January-April 1932	Net Change Amount	Net Change Per Cent.
Rail	340,100	8,564,000	—8,223,900	— 95·0
River	1,258,230	———	+1,258,230	———
Canal	112,000	96,000	+ 16,000	+ 16·7
Coast	———	*2,465	— 2,465	—100·0
Total	1,710,330	8,662,465	—6,952,135	— 80·2

*Argentine Corn.

As the volume of grain received at the port varies in accordance with the demand for exports, so is the visible supply at the port also affected. The visible supply of grain at the Port of New York on April 29th, 1933, was 823,000 bushels, as compared with 2,518,000 bushels on April 30th, 1932.

Visible Supply (Bushels).

	April 29 1933	April 30 1932	Net Change Amount	Net Change Per Cent.
All Grain	823,000	2,418,000	—1,695,000	—67·2
Wheat	93,000	2,476,000	—2,383,000	—96·2
Barley	—	3,000	—3,000	—100.0
Corn	170,000	—	+170,000	—
Oats	15,000	37,000	—22,000	—59·5
Rye	545,000	2,000	+543,000	+27150·0

Export of domestic and Canadian grain at the Port of New York in the four weeks ending May 6th, 1933, amounted to 458,000 bushels, a decline of 90 per cent. compared with the same period in 1932. Exports of Canadian grain fell off 79 per cent., while the traffic in the domestic variety was practically nil.

Exports of Grain at the Port of New York (bushels)

	Four Weeks ending May 6 1933	Four Weeks ending May 7 1932	Net Change Amount	Net Change Per Cent.
Domestic and Canadian Grain	458,000	4,637,000	—4,179,000	—90·1
Domestic Grain	3,000	2,414,000	—2,411,000	—99·9
Canadian Grain	455,000	2,223,000	—1,768,000	—79·5

The domestic grain exported in the above period consisted of 2,000 bushels of oats and 1,000 bushels of corn.

The exports for the 18 weeks from January 1st, 1933, to May 6th amounted to 6,391,000 bushels, a decline of 10,560,000 bushels, or 62 per cent., from the same period last year.

Exports of Grain at the Port of New York (bushels)

	January 1st to May 6, 1933	January 1st to May 7, 1932	Net Change Amount	Net Change Per Cent.
Domestic and Canadian Grain	6,391,000	16,951,000	—10,560,000	—62·3
Domestic Grain	487,000	6,230,000	—5,743,000	—92·2
Canadian Grain	5,904,000	10,721,000	—4,817,000	—44 9

Protection of Iron and Steel from Corrosion

The Importance of International Paint Standards

International agreement on many aspects of engineering has long been required, and in this connection great interest attaches to a recent contribution by the Dutch chemist, Dr. C. P. A. Kappelmeier, who emphasises, by taking red lead paint as an example, the chaotic state of affairs that at present exists throughout the world in regard to paint.

Various recognised authorities or organisations in Great Britain, Australia, the United States, Germany, Switzerland, and Holland, issue standard paint specifications. Typical are the British Standards Association (London), the American Society for Testing Materials (Philadelphia), and the Deutsche Verband für die Materielprufung. Many other countries, such as Poland, Sweden, Russia, Canada and Japan have the subject of paint specifications under consideration. In a number of cases, however, such as Belgium, Denmark, Finland, Italy and Norway no attention has yet been given to the question of paint standards, while in France certain authorities such as the Air Ministry have their own paint specifications.

The main reason why red lead paint is taken by way of illustration is because the use of red lead has long been recognised throughout the world as the most efficient method known for the protection of iron and steel structures and plant of all kinds from rust and corrosion, especially as regards exposure to sea water and other severe conditions.

Essentially, it will be remembered, red lead paint acts in a "triple" capacity, forming a dense, heavy, smooth film, which gives excellent protection in the physical sense, giving because of the oxidising properties, a resistant " passive " film of iron oxide on the surface of the iron or steel, and also neutralising traces of acid almost always present in the atmosphere and in rain. The paint is now also of course made with " non-setting " red lead so that it keeps on storage.

Even, however, in the case of the few countries that have adopted recognised standards for red lead paint there is con-standard method for the determination of the actual red lead. the method of analysis to be adopted. In this connection, for example, the British Standards Specifications for the non-setting paint is a minimum of 93.15 per cent. red lead (Triplumbic Tetroxide) and not over 6 per cent. lead monoxide.

As regards analysis, there is also no universally accepted standard method for the determination of the actual red lead. Thus in Great Britain as well as in Australia the method is reaction with excess of sodium thiosulphate in presence of sodium acetate and acetic acid, and determination of the remaining thiosulphate by direct titration with standard iodine solution. In the United States, however, an iodine method of analysis is employed, while permanganate of potash is used in Germany, and all three methods give different results.

Obviously, therefore, international agreement on the subject, both specifications and method of analysis, is urgently required. For example, there is already in operation an International Standards Association and an International Electrotechnical Commission, dealing with many sections of engineering and technology, but no attention has yet been paid to the highly important subject of paint.

The Port of Glasgow and Empire Trade

By HAROLD M. FORD, Commercial Manager of the Clyde Navigation Trust

Of all the great problems confronting not only Great Britain and the Dominions and Colonies overseas, but the whole world, to-day, none figures more prominently than that of the promotion and development of trade throughout the world's markets. Such questions as War Debts, Disarmament and Economic Conferences, important as they may be, rank second to that of trade recovery, for in the minds of producers, industrialists, merchants, shippers, bankers, employer and employee alike, universally the one question of a return to trade prosperity transcends all others of national and international importance. Upon trade depends largely not only the relative position of the various nations of the world, but what is of such vital importance to the British Empire, the supremacy of the Empire and the advancement and well-being of its peoples. To-day more is being heard of Empire unity and Empire co-operation than at any time in our past history. The great Ottawa Conference has been held and reciprocal tariffs and agreements—the dream of that great statesman, Mr. Joseph Chamberlain—have become a reality. True, these are but yet in their infancy, and doubtless will be amended and extended as changed circumstances necessitate and opportunities allow. These, however, surely indicate the supreme importance which is attached to the great question of trade and its bearing upon the future strength, unity, development and welfare of our Empire by those Imperial Statesmen who met in Conference last year.

Unrealised Marketing Possibilities.

There is, perhaps, no corner of the Empire where this question of trade development can lay claim to more importance than within the Union of South Africa and Rhodesia so far as their production and exports are concerned, particularly in view of the fact that South Africa's purchases from the Mother Country are, and have for years been, far in excess of this country's trade with South Africa. It may, however, certainly be said that there is no quarter of the Empire at the present time where this question appears to be so little recognised when one considers the enormous possibilities awaiting commercial development in the markets of Britain, particularly in regard to some of South Africa's primary products. In this connection no more glaring case may be instanced than that of her fruit industry, which has become, in the space of a comparatively few years, one of her principal sources of revenue, upon which depend the prosperity and livelihood of an increasingly important section of her population. The progress and future expansion of this important industry can only be accomplished by the development of satisfactory markets overseas. Undoubtedly, Great Britain must be the principal marketing outlet for South Africa's fruit export, particularly if the spirit of reciprocal trading is to be translated into a live reality.

A Spectacular Development.

What is, therefore, the position of South Africa's fruit industry? It is only some 12 years since her exports to Britain were comparatively negligible. In that relatively short space of time there has been a development so rapid and, one might say, spectacular, as to place South Africa in the front rank of fruit exporting countries of the world, a development which is becoming one of the principal features of her agricultural life. Last season her exports of citrus fruits to Britain totalled nearly 2,000,000 boxes, and her deciduous fruits over 3,000,000 packages. These figures are in themselves a striking testimony of the industry, perseverance, pluck and tenacity of both growers and those associated with them, whose labours and capital have opened up for South Africa such a valuable and important export trade. So much for her production and development, but what of the all important question of marketing and salesmanship? Up to the present, like most of our other primary producing Dominions in the past, the South African outlook as to Home markets has been a cramped one in so far that the general opinion appears to have prevailed that, unlike their foreign competitors, South African growers and those responsible for their marketing have visualised London as the only market serving the forty-six million people of these Islands. How dangerous and disastrous is this view is surely reflected in the fact that, whereas the products of their foreign competitors are gaining firm holds upon all the principal markets of Britain, those of South Africa, whilst not entirely unknown, have only reached the fringe of these markets.

Great Markets of the North.

Here in Glasgow we have markets dating back to 1175, serving for the foreigner a population of some six millions, extending to the far North of England and covering the whole of Scotland and Northern Ireland. Proceeding southwards there is Manchester, with old established markets, together with Liverpool—the natural feeders for another twenty-four millions of people, comprising the most densely populated industrial area of the world; all three markets capable of a huge development so far as South African fruits are concerned, but in the main comparatively starved of supplies. An encouraging start has certainly been made in the direction of Liverpool, where some half-dozen shipments of South African fruits were despatched last year, which hitherto had been discharged at Southampton. So far as Glasgow is concerned, its Fruit Market is the centre of supply for the largest consumption of fruit per head of any area in Britain. How many growers in South Africa realise that the Glasgow market is the third largest apple market in the United Kingdom, selling satisfactorily year by year the equivalent of about two million cases of North American apples, a quarter of a million cases of Australian, and over 150,000 cases of New Zealand; that it is the second largest market in Britain for Jaffa oranges—its sales approximating to well over half-a-million cases a year, and from Valencia over a quarter of a million cases, to quote only a few instances, irrespective of the trade which is now being built up with California and South America, and also enormous quantities of other fruits, such as grapefruit, lemons and deciduous fruits?

Northern Buyers want the Trade.

When it can be shown that out of an export to Britain of nearly two-and-a-quarter million cases of Jaffa oranges, approximately five-sixths are shipped to the markets of Liverpool, Glasgow and Manchester, leaving only one-sixth to London, and that Glasgow, next to Liverpool, has become the largest marketing centre for Jaffa oranges in the short space of nine years, surely it must be realised that so far as the marketing of South African fruit is concerned there is a lamentable lack of appreciation of the possibilities of these great Northern markets by those responsible for the promotion of the fruitgrowers' interests. It is not as though the two seasons clashed, or that the South African fruits were inferior in quality and therefore not acceptable to the public, while it certainly cannot be maintained that our Northern markets cannot, season by season, return prices at least comparable to those of the London market and almost invariably better. Neither can it be suggested that the traders on our respective Northern markets have not been interested or desirous of playing their part in building up their markets for South Africa's fruit products. For three years, on behalf of Glasgow's traders, firms of repute who have made Glasgow market what it is, and on behalf of the Port Authority, which I represent, and which is taking a keen interest in the development of Empire trade in Scotland, I have consistently urged upon all concerned the desirability of an orderly, systematic development of our markets.

Union High Commissioner Impressed.

Two years ago South Africa's High Commissioner, Mr. C. T. te Water, accepted an invitation to visit Glasgow to investigate at first-hand the possibilities of our markets—a visit which was extended to Liverpool—and which left no doubt in his mind as to where the future prosperity of South African growers and the future development of her fruit industry lay, namely, in our great Northern markets. When here he met and conferred with a large number of traders, who impressed him not only with their keenness to participate in this expansion of trade, but with the evidence which they were able to produce as to the remunerative capabilities of the markets here in Scotland. May I here say that the interest and understanding shown by Mr. te Water left a marked impression in Glasgow, and his realisation of the lost opportunities, and the practical and cordial co-operation which he has since shown with the object of placing South Africa's marketing on a sound progressive basis, have earned for him not only the appreciation of all interested in this matter on this side, but placed him, in the opinion of the Scottish business community, among the foremost of Dominion High Commissioners as a man of vision, capacity and action.

Uneconomic and Dangerous.

As was pointed out to him, and it cannot be too strongly urged, to continue to ignore the undoubtedly valuable outlets controlled by the traders on our respective Northern markets, who possess the goodwill of those markets, and to perpetuate a cramped policy of London concentration of marketing, with shipping to, and distribution from Southampton, is not only uneconomic but constitutes a real danger to the successful development of South Africa's fruit industry. In order to expand her production, with the employment of more capital and labour, regular and economic marketing is necessary. It is, of course, readily understood that in her early days of production, when exports were relatively small, it was not unnatural that the London market should be the first to be

The Port of Glasgow and Empire Trade—continued

exploited. It was also not unnatural that with the excellent service provided by the Union-Castle mail boats, Southampton should be the most convenient port for distribution, but to-day, with an export of nearly two million cases of citrus fruit, the bulk of which consists of oranges, and over three million packages of deciduous fruits, it is surely evident that not only is there a danger of saturation of the London market, but also a relative danger to the prices obtained consequent upon such risks of overloading, or a periodical glut of supplies. Does it not occur to any student of organised marketing that by the decentralisation of marketing, utilisation of trading channels on our great Northern markets, and the spreading of supplies, the tendency must be to maintain a higher price level on all markets as against heavy fluctuations in London due often to self-created gluts consequent upon dumping the bulk of supplies into one centre?

Wastage in Distribution.

Then again, there is the question of wastage in distribution under this process. The South African grower does not realise that in the limited quantities which are despatched 500 miles overland from Southampton to the Glasgow market, there is incurred a wastage of from 1s. 6d. to 2s. per case, which would be avoided by direct shipments to the Glasgow market, while, what is more important, those Glasgow traders who have had limited supplies doled out have virtually to make the equivalent of the rail carriage on the market in excess of the London price to enable them to maintain London parity level. Surely this position is capable of remedy. Now as to shipping. Under present arrangements there is an agreement with the Union-Castle Line for the carriage of South Africa's fruit to Britain. No one disputes or questions the undoubtedly excellent service which this company provides by the regularity and efficiency of their mail steamers into Southampton. For the last few years, however, it has been necessary to charter refrigerated steamers to carry fruit for which they could not presumably find accommodation. Repeated representations for a service to West Coast ports, emphasising the wasted opportunities in the non-development of our Northern markets, have been made, but practically a deaf ear has been turned to these appeals. As I have stated, some progress has, however, been made in Liverpool.

Ten Seasonal Sailings Requested.

Our request has been, firstly, that our traders should be permitted to build up for South Africa in precisely the same way as they have built up a valuable and remunerative trade for other parts of the world; and, secondly, that there should be a programme of at least 10 vessels in the markets of Liverpool, Manchester and Glasgow, ensuring regular supplies throughout the season. I have conferred with some of the largest firms on all three markets, who are unanimous in their view that these markets can easily absorb approximately 100,000 cases of citrus fruits per vessel, covering a range of 10 shipments for the season. I have already pointed out the relative position of supplies of Jaffa and Valencia oranges. Is it not reasonable to suggest that with the preponderance of the consuming population of Britain at the doors of these three markets, common-sense dictates that at least one half of South Africa's export of citrus to Britain can and should, in the interests of economic and better market returns, be shipped and marketed through the respective ports and markets of the North? Should not there also be a suitable programme arranged for deciduous fruits in their season?

Chartered Ships for the North.

No one suggests that any shipping company should be called upon to attempt the impracticable. It is readily understood that it would be not only unremunerative, but practically impossible for the Union-Castle Line to place its regular weekly mail vessels on a Liverpool, Manchester and Glasgow service, but what we do urge is that those vessels which it is necessary to charter should be definitely berthed for service to West Coast ports and markets, thus eliminating the unnecessary wastage consequent upon Southampton concentration. But even foreseeing that any one particular company might in the future be in a position to provide all refrigerated accommodation into Southampton, what South Africa has to bear in mind is that neither shipping companies nor the Port of Southampton sell or buy one ounce of fruit any more than do the Ports of Liverpool, Manchester or Glasgow. Shipping and ports are facilities, and however great their efficiency as such, they should not be allowed to obscure the merits and the interests of the markets. No trade in any food commodity has ever yet been built up successfully on the Glasgow markets through the medium of a market or port located 500 miles away. What the grower has to realise is that the housewives of the homes of those thirty millions of population in industrial Northern Britain are his real customers, reached through the shop-keepers and the merchants on our respective Northern markets, and not by the process of unnecessary middlemen, unknown on these markets, or through the laborious and expensive distribution through a port carrying a disadvantage of from 50s. to 60s. per ton burden, which South African fruit has to bear.

The Lesson of Australia and New Zealand.

In support of these contentions, there is no stronger evidence available than that which refers to the recent development of trade between Australia and New Zealand with the Glasgow markets. Four years ago I was entrusted with a mission, on behalf of the Clyde Trust, the Glasgow Corporation and the Glasgow Chamber of Commerce, with the object of arousing the producers of those Dominions to a sense of reality of the losses they were sustaining through the non-development of the Northern markets of Britain. In many respects the position four years ago with those countries was virtually the same as that of South Africa in its relation to our markets to-day. Despite an export of over four million cases of apples from Australia not a single case was being shipped to Glasgow, with the result that throughout the Australian season the Glasgow market was literally denuded of supplies, beyond spasmodic quantities brought forward by firms who made speculative purchases at glut rock-bottom prices in London, and, after bearing the rail cost of nearly £4 per ton to the Glasgow market, sold out at a material advantage to themselves in Glasgow. This is identical with what is going on frequently with South Africa's fruit products to-day.

Commonwealth Shipments Trebled.

During that tour I made a statement that Australia's butter, so largely advertised throughout Britain, was virtually unknown on the breakfast tables of thirty millions of population in the industrial North. This was strongly contested by London vested interests, but it was nevertheless true, and subsequently substantiated by an investigation of the Empire Marketing Board. Her meat, canned fruits, wines, flour, timber, and, in fact, practically every commodity which she produces were similarly placed, due to exactly the same circumstances, namely, lack of direct shipping and in many cases lack of direct marketing representation. To-day, all this is being changed. Australian trade with Glasgow has been nearly trebled. In the first three months of this year over 1,000 tons of Australian butter have arrived in the Clyde, and have been successfully marketed by Glasgow merchants; and this season will see an import of approximately 350,000 cases of Australian and New Zealand fruit to the Glasgow market, shipped to Glasgow—not to Southampton—and marketed through Glasgow traders; while likewise thousands of tons of New Zealand meat, dairy produce and fruit are being shipped to the Clyde. Could there be anything more conclusive in support of orderly and decentralised shipping and marketing?

Glasgow Turns to Foreign Suppliers.

If any evidence is required of the appreciation by foreign interests of both the value and opportunities of the Glasgow market, it is certainly provided in the developments which are this year taking place in connection with citrus fruits from both California and South America. Tired of excuses and procrastination in connection with South African fruits, Glasgow traders have this year opened up the way for the development of their markets in fruits from these two countries. For the first time eight shipments of oranges are being brought to the Clyde from South America, and a similar programme from California. The possible development has been foreshadowed in all the discussions which I have had with South Africa's representatives. For years past South Africa has had an open door to our markets, where with the close of the Jaffa and Spanish seasons there has been virtually no competition.

Capitalise Scottish Goodwill.

In the opening of this article I referred to the Ottawa Agreements and reciprocal Empire tariffs. I suggest that the value of these will become negligible to South Africa so far as they relate to our markets, so long as she persists in the present wasteful, uneconomic method of supply and marketing. Tariffs or no tariffs, in those 16 shipments of North and South American fruits is represented the inauguration of what might easily become a second Jaffa development here in Scotland. To the South African growers, who stand to gain most by the development of new markets, I would suggest that there is yet time for South Africa to take her rightful place in our markets and capitalise that goodwill which undoubtedly exists towards Empire products and Empire producers here in the North to-day. In this article I have concentrated largely upon the South African fruit industry. There are equal opportunities for a considerable development of trade in dried fruits, canned fruits, eggs, wines, hides, skins, tobacco and other commodities. In conclusion, Glasgow, as the industrial capital of Scotland, with its far-reaching connections, extends a hand of welcome to the producers of the Union of South Africa and Rhodesia to explore and exploit our markets in the name of Empire trade and Empire unity. Will they grasp it, or continue to bow to a policy of drift and seeming indifference, and so miss a golden opportunity?

A part of our stockyard

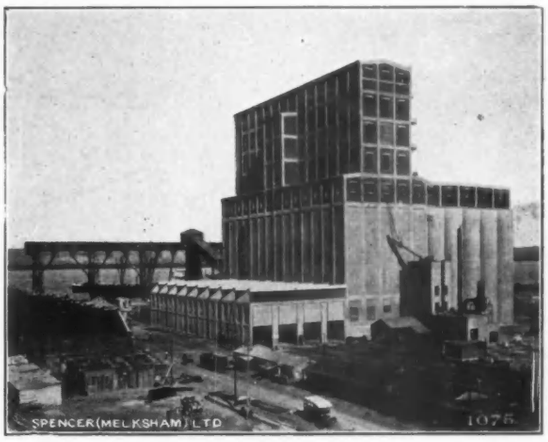
SPECIFY WILLIAMS' PILES
LARGE STOCK FULLY MATURED
FOR IMMEDIATE DELIVERY

CAST STONE, GRANOLITHIC UNITS OR
ANYTHING IN PRE-CAST CONCRETE

SAMUEL WILLIAMS
AND SONS LTD

Royal 9033 8, LLOYDS AVENUE, LONDON, E.C.3. Estd. 1854

IN SOUTH AFRICA
GRAIN SILOS
WITH A TOTAL CAPACITY OF 150,000 TONS



ARE
COMPLETELY EQUIPPED
WITH
SPENCER
HANDLING PLANT
WRITE FOR OUR ILLUSTRATED BOOKLETS
SPENCER (MELKSHAM) LTD., MELKSHAM, WILTS.

"Barnard" Grabs

ILLUSTRATION SHOWS FOUR GRABS FOR OPERATING FROM A 16-TON BRIDGE CRANE
The materials handled include Coal, Coke, Sand, Big Stones and Heavy Steel Scrap. Loads are conveyed from ship to trucks or vice-versa

Wm. Goodacre & Sons, Ltd., Russell Road, London, E.16
Phone: Albert Dock 1741 (4 lines) 'Grams: Goodacre, London Codes: A.B.C. 5th Edn. and Bentley's

VED HENVENDELSER TIL ANNONCERENDE BEDES DE REFFERERE TIL "THE DOCK AND HARBOUR AUTHORITY."

Aden Port Trust

The following are the returns for the month of April, 1933, of shipping using the port:—

	No.	Tonnage
Merchant Vessels over 200 tons ...	127	581,312
,, ,, under 200 tons ...	6	845
Government Vessels	9	26,893
Dhows	111	4,122
PERIM.		
Merchant Vessels over 200 tons ...	17	58,570

The total value of imports excluding Government stores was Rs.40,07,000, as compared with Rs.49,27,000 for April, 1932, and of exports Rs.23,68,000, as compared with Rs.23,35,000.

The total value of both imports and exports together was Rs.63,75,000, as compared with Rs.72,62,000.

Imports during the month were above those for April, 1932, in the case of gums and resins, hardware, skins (raw), twist and yarn, tobacco (unmanufactured and manufactured); and below in the case of coffee, grain, pulse and flour, hides (raw), seeds, sugar, piece goods (grey, white and printed or dyed) and treasure (private).

Exports were above those for April, 1932, in the case of grain, pulse and flour, gums and resins, hardware, seeds, skins (raw), piece goods (white and printed or dyed), twist and yarn, tobacco (unmanufactured and manufactured); and below in the case of coffee, hides (raw), sugar, piece goods (grey) and treasure (private).

TRADE OF THE PORT.

Article.	Unit	Imports.		Exports.	
		Quantity.	Value Rs.	Quantity.	Value Rs.
Coal	Tons	0	0	0	0
Coffee	Cwts.	5,776	1,83,190	6,772	2,69,179
Grain, Pulse and Flour	,,	35,770	1,68,666	30,535	1,29,541
Gums and Resins	,,	5,789	79,011	4,236	82,881
Hardware	—	0	21,695	0	17,144
Hides, raw	No.	130	105	426	442
Oil, Fuel	Tons	49,775	12,44,375	0	0
,, Kerosene	Gls.	5,592	3,844	6,404	4,833
,, Petrol	,,	29,213	37,290	1,136	1,497
Salt	Tons	0	0	18,950	2,01,600
Seeds	Cwts.	2,612	14,762	1,140	8,639
Skins, raw	No.	271,389	1,32,487	471,968	2,97,158
Sugar	Cwts.	8,578	49,069	10,044	57,233
Textiles—					
Piece Goods, Grey	Yds.	3,22?,000	4,24,138	2,426,185	3,05,865
,, ,, White	,,	587,936	95,174	352,211	67,833
,, ,, Printed or Dyed ..	,,	848,129	1,69,592	920,790	2,01,283
Twist and Yarn	Lbs.	369,535	1,81,115	299,272	1,56,381
Tobacco, Unmanufactured	,,	1,429,232	2,12,201	741,216	1,12,201
,, Manufactured	,,	45,136	38,228	20,356	16,165
Other Articles	No. of Pkges.	54,807	8,23,539	15,515	3,19,871
Treasure, Private	—	0	1,29,789	0	1,18,000
Total ...	—	—	40,07,270	—	23,67,746

The number of merchant vessels over 200 tons that used the port in April, 1933, was 127, as compared with 120 in the corresponding month last year, and the total tonnage was 581,000, as compared with 531,000.

Excluding coal, salt, fuel oil and military and naval stores and transhipment cargo, the total tonnage of imports in the month was 8,400 and of exports 5,200, as compared with 8,900 and 4,200 respectively for the corresponding month last year.

Bombay Port Trust

At a meeting of the Trustees of the Port of Bombay, held on May 16th, 1933, the following were the main items of business disposed of:—

A Government notification appointing Mr. A. N. J. Harrison (Ag. Agent, B.B. and C.I. Railway) to be a member of the Board of Trustees of the Port of Bombay *vice* Mr. M. W. Brayshay, appointed to act as Chief Commissioner of Railways, was recorded.

An estimate amounting to Rs.11,000 was sanctioned for provision of cast iron roller paths—to form a smooth running way for the quayside wheels of hydraulic cranes—at Nos. 18 and 19 berths, Alexandra Dock Harbour Wall; other minor items sanctioned included the provision of additional fire hydrants to serve the Wadi Bunder Oil Installations and of storm-water entrances at Dumayne Road, Colaba.

A 50-year lease of Plot No. 36 at the junction of Colaba Causeway and Arthur Bunder Road (area about 851 sq. yds.) was granted for motor garages and workshop, and residence on the first floor.

* * * *

At a meeting of the Trustees of the Port of Bombay, held on May 30th, 1933, the following were the main items of business disposed of:—

The election by the Indian Merchants' Chamber of Mr. B. A. Khimji *vice* Sir Purshotamdas Thakurdas, Kt., C.I.E., M.B.E., on leave, and by the Bombay Chamber of Commerce of Mr. J. J. Flockhart *vice* Mr. G. H. Cooke on leave, as members of the Board of Trustees, was recorded.

The following expenditure estimates were sanctioned:—

Rs.20,000 for carrying out special repairs and renewals to certain of the docks cargo cranes during the current year, being part of a 9-year programme for the complete overhaul and repair of all hydraulic cranes in the docks.

Rs.9,160 for laying a sewer in Arthur Bunder Road in connection with the development of the Old Cotton Green at Colaba into a residential estate.

Rs.3,000 for special repairs to the floating crane "Sarus."

Rs.2,000 for renewing crane roller paths at "A" Shed, Prince's Dock.

Rs. 450 in connection with the issue of a "Port of Bombay" Magazine for the purpose of publicity.

Subject to the sanction of Government, an amendment of the Docks Scale of Rates was approved to provide for the levy of a special dock due of Rs.20 per occupation of the Ballard Pier Wharf on vessels not exceeding 1,000 tons gross register engaged in pleasure cruises or excursions within the harbour, other than for charitable or private purposes.

The following leases were granted:—

A 3-year renewal of godowns at Town Bunder (area about 425 sq. yds.).

A 50-year lease of land and buildings at Frere Road comprising a ground area of 4,284 sq. yds. for shops, offices, residences and godowns.

A 99-year lease of Plot No. 1 (area about 967 sq. yds), Apollo Reclamation, fronting Colaba Causeway, for first-class residences with shops on the ground floor.

A 99-year lease of Plot No. 26 (area about 1,672 sq. yds. inclusive of garden space), Apollo Reclamation, for first-class residences.

A 5-year lease of 12,025 sq. yds. of land at Wadala to the Bombay Petroleum Company for a bulk kerosene oil installation.